

September 24, 1956 50 Cents

AVIATION WEEK

A McGRAW-HILL
PUBLICATION

Vortac Impact on
Avionics Industry

•
Report on Space
Scientists in Rome

Convair R3Y-2 and Grumman F9F-8s





**CONVAIR 880
JET-LINER**

**Picture of your
bright "Jet-travel" future!**

Fastest commercial airplane in the world—600 miles vibration miles an hour! The Convair 880 Jet-Liner will be powered by four of the world's most advanced commercial jet engines—General Electric CJ-805's. The only jet transports designed to operate from over 100 already existing airports throughout America! Big city or small, the

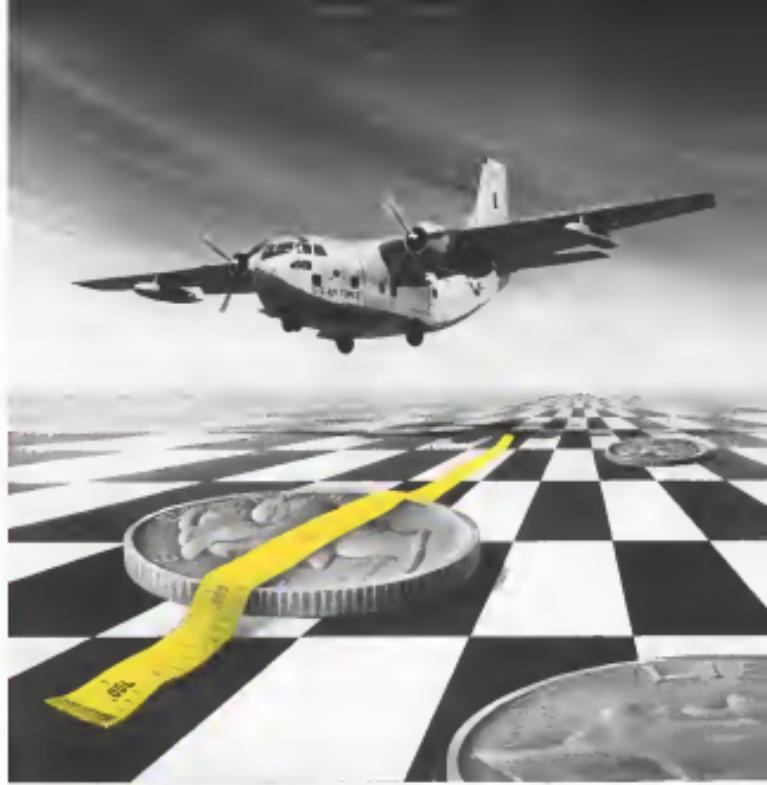
Convair 880 Jet-Liner will bring you luxurious jet-travel whether your destination is 2,000 miles away—or only 300. Soon you will travel faster, in more luxury and comfort than you've ever known before in Convair's 880—the all-new JET-LINER.

CONVAIR

CONVAIR AIRCRAFT CORPORATION



KENYON 1960 JET LINER WILL
FLY FASTER THAN THE WINGS OF
TWA 



**The C-123 can't stop on a dime—
but it can land in 700 feet!**

FAIRCHILD

**AIRCRAFT DIVISION • HANOVERTON, OHIO, WARREN,
A Division of Fairchild Engine and Airplane Corporation**

... WHERE THE FUTURE IS MEASURED IN LIGHT YEARS

rutted, unpaved, or sandy ground are taken in stride by this rugged ship. And sophisticated aerodynamics design makes possible a landing run of only 700 feet—a takeoff run only a little longer. Performance, ruggedness, payload and versatility . . . these are traditional hallmarks of Fairchild aircraft.



"Laminium Shims simply press-fit down to sheet size. This takes about a minute, instead of a half hour's grinding time."

"We use Laminium to provide precise spacing between the transom and the landing gear cut-outs on the strut."



"This 10" Laminium Shim is pared to exactly .005" in thickness, and we do it in a matter of minutes."



"Here are just a few of the many types of Laminium Shims used on our main line for wing assemblies."

Aircraft Producers advise... "as tolerances

become tighter, Laminium® is a must!"



"We join this leading edge wing spar in 6 places, and the Laminium Shim at each place assures maintaining the SCL of the wing."



"For the trailing edge wing spar, we peel Laminium Shims down to an exact fit between the center line of the spar and the center line of the horn."

The demand for Laminium Shims has grown so much during the past few months that we wondered just exactly who, where and how they are being used - so extensively. We put the question to assembly specialists in major aircraft plants, and here are their answers - *as tight as we say, but what does say about the use of Laminium Shims in modern aircraft production...*

"Our act. [Chase contour line] is maintained to precise specifications with Laminium Shims. Without them, the wing components would tend to twist with the forces of modern jet flight."

"Shims must be flat for a close fit, which we always get with Laminium Shims. As tolerances become tighter, Laminium is a must in modern production schedules."

"In the past we would either have no way to work for an available tolerance, or ground or hand file a shim to fit. With Laminium, we do a precision job in minutes."

"Laminium Shim units rest about the same as solid shims. But they eliminate material losses. Reduced inventory and handling. Streamlined production."

LAMINATED SHIMS OF



are custom-made precisely to blueprint. Laminations are completely surface-bonded to look and act like solid metal, yet quickly pared to a precision fit right at assembly. Available in Brass, low carbon Steel and Type 303 Stainless, with .002" or .005" tolerances. Also in Aluminum with .002" tolerances. Laminum Shims eliminate costly extra operations - no machining ... no grinding ... no stacking ... no adding. And no grit between layers ... ever!

FREE Action sample of Laminium-aluminum laminated Engineers by John P. White. For your copy today.



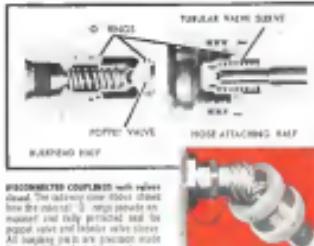
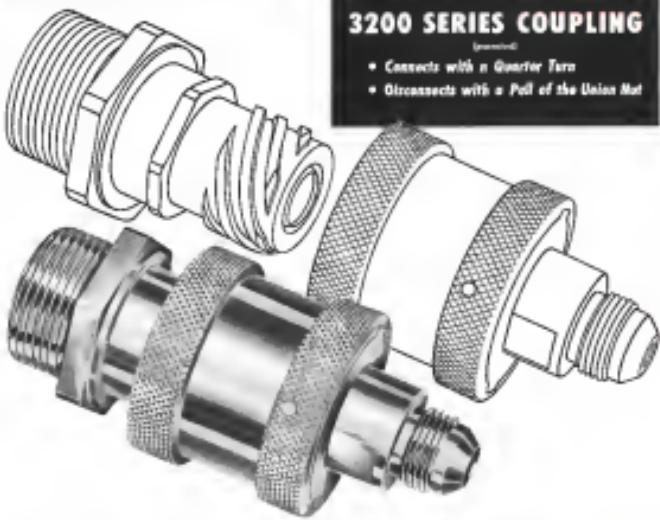
SHIM HEADQUARTERS SINCE 1918

Aeroquip Announces a NEW

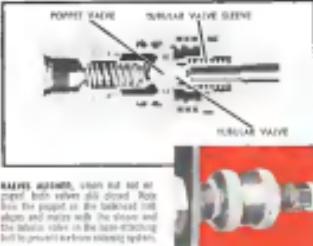
3200 SERIES COUPLING

(patented)

- Connects with a Quarter Turn
- Disconnects with a Pull of the Union Nut



DISCONNECTED COUPLING with valve closed, shows how the two parts are joined. The retaining ring, O-rings, sleeve and housing are easily removed. Hose from the pump or the hydraulic line aligns with the sleeve and the忠形 valve in the hose-retaining belt to prevent air from entering system.



CONNECTED COUPLING with valve open, shows how the two parts are joined. Both valves are closed. Hose from the pump or the hydraulic line aligns with the sleeve and the忠形 valve in the hose-retaining belt to prevent air from entering system.

3000 PSI. Self-Sealing Coupling

SAFE... may be checked visually or manually for locked position.

SIMPAT... there are only 13 parts plus "O"-rings and lock-up rings.

FOOLPROOF... there is no stable intermediate position where the coupling is partially seated and unlocked.

NO FLUID LOSS... the patented Aeroquip design prevents fluid loss during connection and disconnection.

NO AIR INCLUSION... the coupling cannot admit air into the fluid system during connection and disconnection.

Designed to meet the requirements of proposed military specification MIL-C-25427

It took Aeroquip to improve an Aeroquip Self-Sealing Coupling!

The new 3200 Series Self-Sealing Coupling offers the same basic advantages for which Aeroquip Couplings are well known: NO fluid loss upon disconnection, NO air inclusion during connection. In addition, it offers plus advantages that contribute to improved design, maintenance, and service of aircraft.

It's fast acting! A quick quarter turn of the union nut fully connects the hoses and assures full flow of fluid. An easy pull on the union nut disconnects the coupling causing the忠形 spring to snap back firmly with valves closed.

It features visual and manual check for locked position.

By noting the position of the locking hex, or attempting to turn the union nut, or lay sagging on the attached hose line, one can tell whether the coupling is fully connected. Once connected, the coupling cannot unlock accidentally during normal service.

It features simplicity of design... provides construction specifically for use on modern aircraft and engine hydraulic systems up to 3000 psi. At 273°F., the 3200 Series Self-Sealing Coupling is highly recommended for use wherever lines must be disconnected while systems are operational.

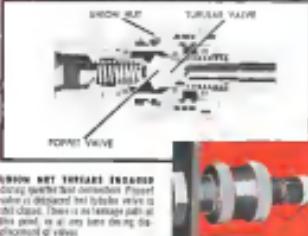
For further information, write for Engineering Bulletin AEB14.

Aeroquip

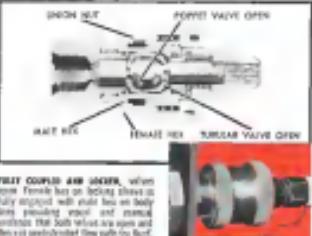
AEROQUIP CORPORATION, JACKSON, MICHIGAN
AERO-COUPLING CORPORATION, BURBANK, CALIFORNIA
(A Subsidiary of Aeroquip Corporation)

IN CANADA: AEROCHEM INDUSTRIES LTD., TORONTO, ONTARIO
(A Subsidiary of Aeroquip Corporation)

LOCAL REPRESENTATIVES IN FRANCE, GERMANY, U.S.A. AND JAPAN - Aeroquip products are fully protected by patents in U.S.A. and abroad.



UNION NUT THROAT ENDED during quarter turn connection. Poppet valve is depressed but忠形 valve is in the closed position. This is an advantage in that the忠形 valve is not being driven during the quarter turn.



FULL COUPLED AND UNLOCKED, valves open. Female hex on locking sleeve is fully engaged with male hex on body. Both valves are open and manual rotation of the忠形 valve is possible to open and close individual flow path on fluid.

Announcing...

FENWAL'S NEW JET ENGINE HARNESS AND INTERCHANGEABLE THERMOCOUPLES, PROVIDING

- Operation at temperatures over 1200°F
- Foolproof installation, simplest maintenance

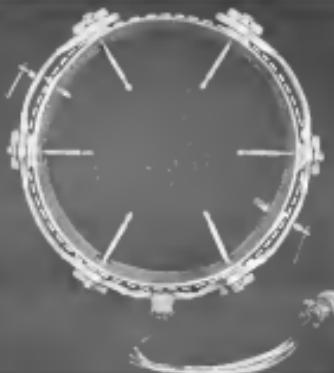
A NEW CONCEPT IN TERMINALIZATION

Fenwal's new concept of Button Terminalization for integrated assembly of thermocouples and harnesses allows a new ease of installation. Only two bolts... and buttons make firm, reliable external contact! It can actually be installed in 12 minutes by a mechanician who has never seen it before. All the thermocouples are offset — and can only be inserted in one way. And should a thermocouple go bad all you have to do is remove two bolts and insert another thermocouple. And that's a great advantage in maintainability.



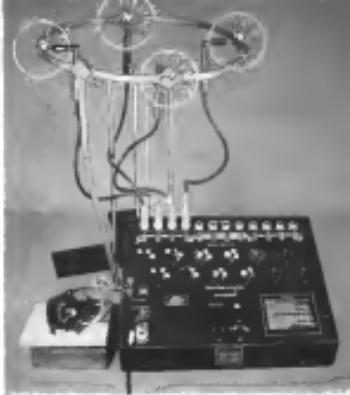
SOLID STAINLESS STEEL CASING PROTECTS WIRES

Even the wires on the Fenwal harness are covered in an insulated blanket and inserted in a stainless steel covering. This prevents the wire from becoming bent and damaged during installation or from vibration, while in use.



DIFFERENTIAL EXPANSION NO PROBLEM

Fenwal's new Button Terminalized harness is rigid, yet flexible enough so that differential expansion will not cause difficulties. It is so designed that even when bent in place the harness is flexible enough so that no great stresses are placed upon the thermocouple leads or the harness by bending. In fact, many times holding brackets do not have to be bolted up! In order to withstand large forces due to differential expansion



BALANCED RESISTANCE HARNESS

The resistance path from each thermocouple to the indicator is equal, minimizing undesired resistive currents and enabling maximum accuracy.



ENGINE TEMPERATURE INDICATION AND/OR CONTROL



WRITE FOR ALL THE FACTS

Fenwal's new concept of integrated harness and thermocouples may be of great service to you. Write for complete data now, to Fenwal Inc., Aviation Products Division, 117 Pleasant Street, Ashland, Mass.

Fenwal

Controls Temperature ... Precisely



How Holley's Compressor Governors Help New Jets to Supersonic Speeds

"City-sweeps" Air Force men call them, the J-37-powered F-100, F-101, F-103 and Navy F8U, with level flight speeds faster than sound. And city-sweeps they could well be. Certainly their rapid approach to the fringe of Mach 2 heralds a new era in the progress of jet flight.

Sharing in the development of this new breed of supersonic fighters, Holley engineers, working closely with Pratt & Whitney Aircraft on the J-37 engine, designed the compressor bleed governor.

This new Holley compressor bleed governor is one more example of Holley's continuing leadership in the design, development and manufacture of superior engine control systems for both military and civilian use.

Look to the
design, development,
and manufacture
of accurate fuel
systems... Holley.



1890 E. River Rd., Toledo, Ohio 43609

A-14



When the heat's on...

Do your specifications call for operations in extreme temperatures with precision accuracy and unfailing dependability in gear control systems, actuators, accessory drives or automated rotary electrical equipment? If so, Western Gear designing, manufacturing and

research skills can quickly step in to solve your most difficult problems with on time delivery. Forty years of aircraft industry experience assures satisfaction. Consult us now!

"The difference is reliability" • Since 1938

Address General Offices P. O. Box 101, Indianapolis, Indiana

PLANTS AT CEDARVILLE, OHIO AND BELMONT, SAN FRANCISCO, CALIF.
DETROIT AND HOUSTON ENGINEERS AND MANUFACTURERS IN PRINCIPAL CITIES





Edison detectors give speedy warning of overheat in atomic pile

Self-monitor design assures fail-safe operation

New Edison Resistance Temperature Detectors are especially developed to meet the exacting demands of the atomic power industry. These detectors are now helping forestall costly fuel cell damage by providing near-instantaneous detection of a rise in temperature in light water moderators.

Super reliable and simple in design, Edison detectors eliminate complex electronic components. Some are rated at 0.8 seconds maximum response time and the high temperature types give an accuracy of $\pm 1.0\%$ at 750°C. Radiation- and corrosion-resistant, Edison detectors have quick disconnect fixtures for installation and maintenance time.

Write for Bulletin 3016 and 3018 for information on types of Resistance Temperature Detectors and remote temperature monitoring systems for every purpose.

A GREAT NAME APPROVED BY THE INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS

Thomas A. Edison
INCORPORATED

INSTRUMENT DIVISION • 1, EASTCHEL AVENUE • WEST PALM, NEW JERSEY

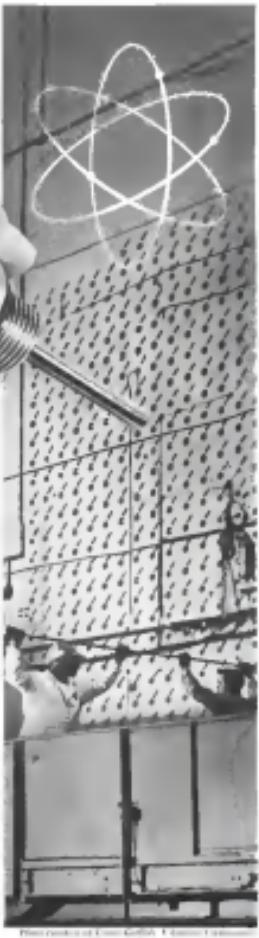


Photo Courtesy of Comin Carbide, Inc., Division of Union Carbide

**Meet the New
ELECTRO-SNAP**

"LANDING GEAR SWITCH"



ELECTRO-SNAP HI-43
with Rugged,
ADJUSTABLE
Roller-Arm Actuator!

Now you can get replaceable switch arms adjustable in a rugged, light-weight version of Electro-Snap's hermetically-sealed HI-43 "Landing Gear Switch." The new HI-43 is laterally changeably rated 100 V dc, 15 Amp and 100 V ac, and allows to the user self-adjusting switch arms to fit over the socket arms with the landing gear in the proper position. When the switch trips, on the lock and.

More robust mechanically, the new HI-43 has a self-locking feature giving 100 V ac at the HI-43 a maximum 200/90 degrees air or mechanical rotation. And the new case keeps the switch safe from moisture, dust, heat, cold, shocks, and knocks by being gasketed and sealed.

Nearly simultaneous make and break contacts are available with each element and the D.E.T., D.F.N.C., D.F.N.O. or 4-terminal D.F.D.T. contact arrangements give users the choice of two contacts used at simplifying complex circuits.

Get full details.

WRITE FOR DATA SHEET NO. 5010-A



ELECTRO-SNAP SWITCH & MFG. CO.
1025 West Lake Street • Chicago 24, Illinois

**Meet the New
ELECTRO-SNAP**

"LANDING GEAR SWITCH"



ELECTRO-SNAP HI-43
with a...
LIGHTER-TOUGHER
HERMETICALLY-SEALED
RIBBED CASE!

PROTECTION is the key word. Electro-Snap's hermetically-sealed switch arms and plastic or protective and the HI-43 "Landing Gear Switch" exceeds requirements! Three "knifed-off" mounting legs hold the switch rigidly and can take continuous vibration without damage. Dry, over dry, or coated seals - hermetically sealed - and the entire case is made stronger by ribs locking the closure plate.

PROTECTION cannot happen over one thousand ways corrosion before it starts, and the resistor assembly is a good example of this. Electro-Snap's metal seals electrically close the switch and the resistor arrangement is a plasma... more protection against moisture and warped glass during check-out and maintenance.

Get full details.

WRITE FOR DATA SHEET NO. 5010-B



ELECTRO-SNAP SWITCH & MFG. CO.
1025 West Lake Street • Chicago 24, Illinois

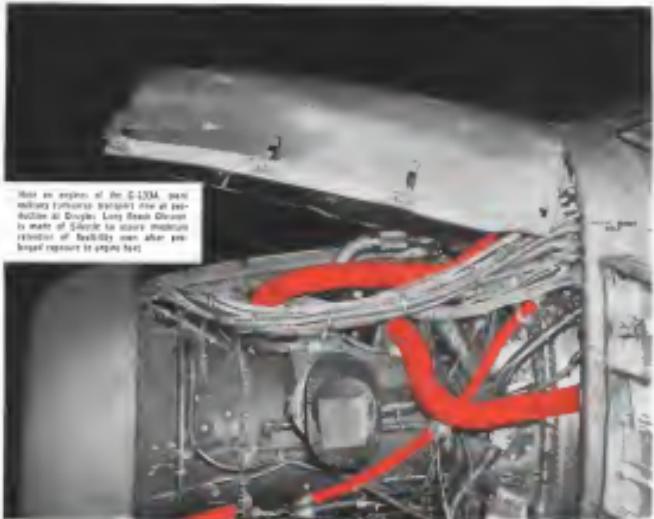
**Meet the New
ELECTRO-SNAP**

"LANDING GEAR SWITCH"



ELECTRO-SNAP HI-43
with these
SPECIFICATIONS

Load Rate, Low Rate : Maximum 200/90	Amperes AC, Adjustable
Operating Voltage : 100 V ac	15 Amp
Switch Rating : 100 V ac (Minimum)	15 Amp
Switch Rating : 100 V dc	15 Amp
With adjustable Tolt Guard	
Switch Rating : 100 V ac	15 Amp
Switch Rating : 100 V dc	15 Amp
Switch Rating : 20 V dc (Minimum)	15 Amp
Switch Rating : 20 V ac	15 Amp
With adjustable Tolt Guard	
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FACTS

about



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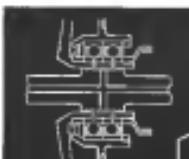
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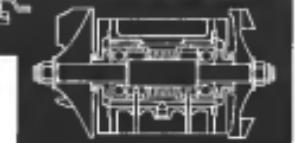
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EDITORIAL

IATA Faces the Issues

The slaying of bagpipes has hardly died away in the north as stop Edinburgh Castle, but delegates to the annual general meeting of the International Air Transport Assn. can already hear the chink of cutlasses and trumpet fanfares of the bell ring that is to start for their next meeting in Spain. The 12th annual general meeting in Edinburgh was notable for several reasons:

First there was the superb hospitality of the host British airline—British Overseas Airways Corp., British European Airways, British Caledonian Airways. Everybody who participated in the IATA program, from the base of the strong military liaison to the public ground of Edinburgh Castle to the final formal ball, will join in congratulating the British host airline on a job well done.

Second, there ran a marked air of dissatisfaction to face squarely the problems looming in the jet transport era to get on with the job of preparing for them now, both technically and economically. The technical side of IATA is well into its program to prepare for the jet age. They are working closely with the International Civil Aviation Organization. The full text of the technical committee report presented by Capt. Anilakar Venkatesan, executive vice president of Sabena Belgian World Airlines, merits close study by both operators and management executives of airlines the world over.

No Place for Political Boundaries

We think one of the most significant portions of this report is the firm viral intent to shoddy air traffic control areas based upon national political boundaries. The use of political boundaries in air traffic control procedures has no place in commercial aviation, even with the 100 mph speeds of current press-powered transports. It will become increasingly dangerous with the advent of 400 mph turboprops and 500 to 600 mph subsonic transports. As the IATA technical report maintained, even now an aircraft has often passed through one of these artificial control areas before it has received proper clearance. The continuation of such speed and communication delays makes this a serious occurrence in Europe airline operations.

The technical committee also recommended that future air traffic control systems should be based upon routes rather than state concepts. We strongly feel we have the technical capability of current aircraft, such as the Lockheed 1019, Douglas DC-10 and Boeing 747, to have made traditional areas concepts obsolete. A switch from route to area control is an absolute must if airline operators are to achieve maximum operational flexibility. This has been apparent and goes the travel public the most efficient and economical service.

Another point worth airing is the technical concern for report in it that international cooperation in the development of new navigation and traffic control equipment with large scale evaluations conducted jointly by all the governments involved. This contrasts with the past practice of developing national systems to the point of operational use and then fighting it out on a

informalistic basis all over the world to plug a particular equipment which airline pilots now flying international routes can testify that the old system has not yet paid off despite the results they need.

During the past six months there has been an encouraging trend in civil aviation bureaus to get down to hard-headed thinking and action on jet age problems. We have seen evidence of this in the recent reorganization of the Civil Aviation Administration, in the special group created at ICAO's Cannes meeting headed by Dr. Edward Werner and by the technical discussions of IATA.

Economic Revolution Pending

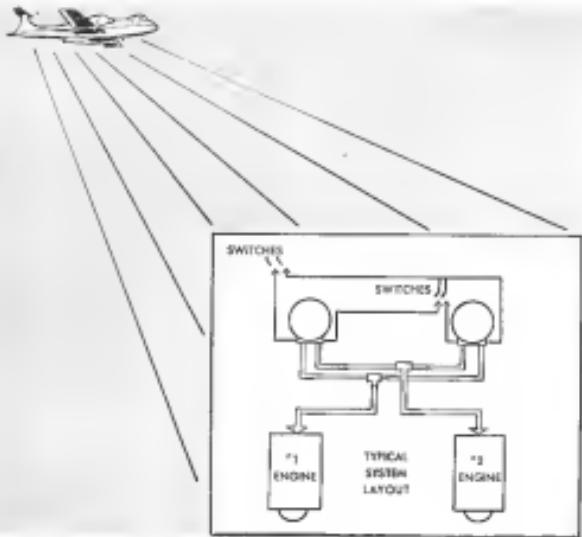
If this going and coming continues over the next few years the advent of jet transports will cause a smooth operational transition that will provide better service to the traveling public with lower fares and set the scene that has been predicted by some pessimistic prophets. In addition to the technical revolution wrought by gas turbine powered transports there already are signs that an economic revolution is in the making as a result of their capabilities. It was most encouraging to hear Lord Douglas chairman of BEA and current IATA president call for the one final energetic approach to the economic problems of the jet transport era as that already being displayed by technical groups.

The first meeting of a jet age economic resolution came last summer with new fare limits for third class type fare proposed by Pan American World Airways for transatlantic routes and the route rate, extensive type fares proposed by Trans World Airlines. The Cannes conference took a step in the right direction, although there will be considerable argument as to whether it was far enough or fast enough. There is little doubt now that some very basic minimum will have to be made in the international fare structure to accommodate the new demands of jet age traffic.

As Lord Douglas pointed out, there must be a place for the turbofan transport in the jet age fare structure to allow both the operator and the traveling public to take full advantage of its lower operating costs. This is where I think the turbofan comes back into the picture again, as he told the IATA Edinburgh meeting. "I think it possible to practice this kind of discipline will offer a level of operating costs significantly lower than those of prop jets." If this new breed to be the case, in IATA will face a tariff problem perhaps more difficult than any we have had before. For it would surely be the duty of airlines in IATA, not only to offer the traveling public the advantages of increased speed which introduction of the pure jet makes possible, but also to give the public a choice of slower service at lower fares. This may soon become the most important, most difficult issue IATA has ever had to face.

As long as IATA can be as forthright and courageous in facing future issues as the atmosphere of the health-conscious general meeting indicated, we think the traveling public can look forward to getting better service at lower fares in the jet age.

—Robert Holt



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WHO'S WHERE

In the Front Office

Torrey Gardner, president, Midway Airlines, Inc.; Duane G. Ward, a director, Pacific Airway Services, Inc. Franklin Cold, Verner Gardner and McKeon held the same posts with a parent company, Skunk Mountain Co.

Donald R. Phillips, general partner of E. T. Hutton and Company, a division of Danair Helicopters, Inc., Anchorage, Conn.

Charles R. Dauphiny, Jr. and Patrick J. Tuohy, vice presidents, Flights, Inc., Inc., New York, N. Y.

John D. Rice, USN, Vice Chief of Naval Operations, Washington, D. C. Mrs. Edie Scherer, John D. Rice.

Frederick N. Springer, former head of the Air Research and Development Command's Directorate of Systems Plans, now vice president of the Colorado Co. 1214 N. University Ave., Park Ridge, Ill.

John P. McKeon, a manager vice president, International Electronics Research Corp., Belmont, Calif.

Honors and Elections

The American Society for Metals will honor the following men during the tenth annual meeting in New Orleans, La., February 11-13: Edgar H. Dierckens, director of research of the aluminum department of Alcoa's Missouri Research Laboratories; the Alcoa Research Achievement Award for his outstanding work on aluminum alloys; research fellow of the ASM; the ASM Gold Medal for "distinguished metallurgy from art to science"; Charles M. White, board chairman of Republic Steel Corp.; ASM Research Medal for his creative leadership of metallurgical research and development; Dr. Meyer S. Tamm, professor and chairman of the Department of Metallurgy at Case Institute of Technology; Dr. William J. Barret, General Director of Worldwide Glass, Inc., Toledo, Ohio; and the 1968 American Iron & Steel Institute Huo Yield Award: Dr. Ernest J. Nease, professor of metallurgy at Research Park Institute, ASM's Testing Award.

INDUSTRY OBSERVER

► Northrop's new Sparrow III (air-to-air) missile will go into full-scale production next year at Northrop's Bristol, Tenn., facility where Sparrow II now is being built. Sparrow I missiles, Raytheon, which developed the Sparrow III, will take over management of Bristol facilities from Sparrow as Sparrow II production is phased out.

► Earth satellite, which Soviet Russia recently announced it will launch during the International Geophysical Year, may be given a polar orbit to provide data in complement to that obtained from the U.S. satellite's elliptical orbit. Russians agreed to let satellite representatives that is compatible with U.S. satellite to prevent both nations to obtain data from the other's vehicle. U.S. scientists reportedly favored Russian satellite place prior to official Soviet announcement.

► Convair T-37A jet trainer aircraft is being modified to provide the student with complete instrument panel with the instructor getting basic training along the way. Engine instruments are centered in the side-by-side trainers. An 11-plane contract has been completed by Convair and work on a second USAF contract for 20 aircraft is under way. First plane of the second contract will be delivered this month.

► Retirement of Basler Bear credits the brother with a maximum speed approaching 450 mph, with power supplied by four 12,000 rpm hydroturbines driving contra rotating propeller propellers. Other data: cruise speed is 350 to 370 mph at 50,000 ft; range is 3,000 nm; gross weight: 310,000 lbs.; span, 189 ft.; length, 35 ft. Little information confirm earlier American Vans estimates.

► Simplified helicopter rotor system developed and flight tested by Bell Aircraft Corp.'s Texas Division eliminates the massive weight and reduces number of parts in the system.

► De Havilland of Canada's DHC-3 twin engine transport will have the engine of a DHC-1 and the landing and takeoff characteristics of the canopus's DHC-1. The aircraft bears designation as a trap transport for the Royal Canadian Army with 17,000 lb. with a payload of 7,000 lb. De Havilland held up development of the aircraft pending the military contract, but end sales prospects are so bright that the company probably would have gone ahead on its own.

► Royal Air Force leaders believe that manned bombers will be required at least until 1970, with a strong possibility that the need will continue beyond that date. However, there appears to be no definite plan for a Mach 3 bomber development in the British aircraft industry.

► Army has under serious consideration a proposal by Cornell University's aviation center to research prop-fan technology as a means of helicopter anti-capture. Contract is reported to be in the works. It would be funded by the Army Transportation Corps and administered by the Office of Naval Research.

► Lockheed F-104A is being flown by General Electric crew at Edwards AFB, Calif., in continuing test program of the company's 75-hp turboprop engine. Specific testing of the engine in a production aircraft gives General Electric valuable data for possible powerplant improvement.

► Delighton headed by Col. Jim Sod Goodman, commander in chief of the Venezuelan Air Force, is studying purchase of medium aircraft Fokker F.27, Avro 748, and Canadair CL-415, of Montreal. Venezuelan buyer shows interest in Canadian-built Syber powered by Orivida engine similar to those recently purchased by the Cubanair and South African air forces.

► Second ATR-9 turboprop engine has entered the flight-test stage. ATR-9 has four composite stages in contrast to seven and eight on earlier models. Static thrust is rated at approximately 9,200 lb. At Mach number model, the ATR-9 is rated at 12,000 lb. for the first stage.

(Continued on page 101)

Washington Roundup

Less Money for Small Business

Senate Small Business Committee, after studying defense contracts, found that small firms were getting less money than large ones.

Small business contractors say they are getting less money than large ones. A staff report of the committee notes that during the first five months of fiscal 1956, only 70.8% of the total dollar value of defense business was awarded to small business as compared with 21.5% during fiscal 1955.

In its periodic report, the Department of Defense reported some of the reasons why the full potential of small business contracts is not going to small business. One reason, for example, reported by the agency is that small business firms did not bid for contracts because the small firms did not feel the contracts, the bids were not low bids, they did not meet specifications.

More Contacts More

Many fast informal contacts with Rep. Miles was reported last week. The small Naval Research Laboratory team that packed up radio isolators from Venus earlier this year detected signals from Mars at 3 cm. with a 680 m. radio telescope. Since more than 50 instruments were necessary to establish the certainty of the contact, further attempts to detect the red planet at 136 m. were frustrated by errors. Scientific first reception of planetary radio emissions was not accomplished by the German Institute of Technology, according to members of the Mars' investigation. In the autumn of 1954, they packed up their amateur, state-of-the-art gear from Jupiter that were millions of times stronger than thermal radiation from Jupiter should be. They are still surprised.

The Naval Research Laboratory also made news last week by achieving the fast controlled release of atomic energy in the Washington area. The Army has had a transonic power and heat plant under construction at Ft. Detrick, Md., for over seven years and another type has just been submitted by the University of Maryland, but the Navy's "surprise proof" reactor already is undergoing extraction and checkout.

Political Notes

Most of the key figures on aviation affairs in the House of Representatives will return with the new Congress next month.

Rep. George Cannon (D-Mo.), chairman of the Appropriations Committee, has no opposition. Vocal critic of Defense Secretary Charles Wilson during the last session, Cannon is a strong supporter of strategic air power and, in recent years, has campaigned for opposition to all裁军 measures.

Rep. George Mahon (D-Tex.) chairman of the Appropriations Subcommittee on the Armed Services who is also unopposed. During several years, he has kept a watchful eye on military procurement practices, and deserves staff recognition.

Rep. John Fisher (R-N.Y.), ranking Republican member of the Appropriations Committee, has only token Democratic opposition in his predominantly Republican district. Budget cutting, defense and otherwise, is his major specialty.

Rep. Carl Vinson (D-Ga.), chairman of the Armed Services Committee and a leader on defense policies during his 16 years in the House, is without opposition.

So is **Rep. Edward Hebert** (D-La.), chairman of the Armed Services Investigating Subcommittee, which made a comprehensive study of procurement and profit policies of military aircraft contractors.

Rep. Roger Short (R-Va.), ranking Republican member of the Armed Services Committee, has unsuccessfully negotiation from Charles Erwin, 35 former aide and television studio manager. Short, however, plans an active campaign and is expected to win. **Rep. William West** (R-Okl.), ranking Republican on the Armed Services Investigating Subcommittee, has a stiff reelection fight in his marginal district.

Rep. Percy Price (D-Tenn.), chairman of House Committee on Small Business, and **Rep. Guy Barnes** (D-Ala.), chairman of the Subcommittee on Aviation, have no opposition.

However, outcome of the elections of the three top Republicans of the House Committee Committee is uncertain. **Rep. Charles Wohrman** (R-N.J.), ranking Republican member, is backing a strong and controversial Democratic state organization. **Rep. Joseph O'Halloran** (R-N.Y.), who became second-ranking Republicans on the death of Rep. Carl Hatchett, is countering with an stiff fight against Democratic Farmer Laborite Harold Zapp.

The outcome of the Sept. 9 race of **Rep. Robert Hale** (R-Md.), third-ranking Republican still in a seat, The last contest gave Hale a victory by 29 votes.

Airworthiness Review

Civil Aerostatons Board (CAB) hopes to have its Airworthiness Review draft ready sometime in mid-October. Proposed amendments to the Civil Air Regulations in the draft release will be based upon discussions held earlier this month at the annual aerostatons review. Industry and government technical experts, including delegates from eight other nations, discussed proposed changes in regulations during a working meeting in Washington.

Chief point of interest at the meeting was the CAB's proposed new performance test for robust powered transports, but discussions were nevertheless confined largely to clarifications of language in the proposed Draft Rules. At the meeting, the American delegation felt that the airworthiness transportation forums then were inappropriate to discuss the plan. This has forced the CAB to move the Oct. 15 deadline for comments in 30 days back to June 15. An Air Transport Area official told the meeting that the airlines and manufacturers are developing a work program to obtain data and apply them to various studies in order to determine the effect of the rules proposed in 30 days.

New Money for IDA

Defense Department's Weapon Systems Evaluation Group has negotiated a \$4.7 million contract with the 14th Air Force, Atlantic Division, the new organization formed by a group of civilian engineers, mathematicians and scientists for the Joint Chiefs of Staff and the Assistant Secretary of Defense for Research and Development (AFD). Min. 21, p. 29. The contract runs through next June.

Testers of the institute have named Maj. Gen. James McCormack Jr. (USA-U.S.A.) as president.

—Washington Staff



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First Vanguard Tests Scheduled This Fall

Rome space congress told of Vanguard satellite's first steps, Russian plans to launch own vehicle.

By David A. Anderson

Rome—First tangible steps toward space flight will be taken this fall with the launching of the first Project Vanguard test vehicle. This announcement, coupled with confirmed knowledge that the Soviet Union plans to launch a satellite as part of its contributions to the International Geophysical Year, highlighted the Soviet Congress of the International Astronautical Federation.

This congress, as others before it, was a study in sharp contrast between the Soviet Union's contributions and its limited contributions to available funds. For 450 scientists, engineers and technicians gathered at the congress, more than double last year's attendance, 45 papers added to the number of those giving field of science.

About one-third of the presentations were concerned with the problem of artificial satellites, the rest covered the spectrum of space flight from chemical kinetics to a proposal for a manned satellite.

Vanguard Details

The landscape of scientific cosmic flight was well developed for the direct gain of man's ray damage. The few bits of experimental data on magnetism, now extrapolated only with some degree of confidence, underscored the problem facing space voyagers before understanding the suggestion of another recentant for a one-year exploration tour from earth to Mars to Venus and back home again.

The first component of the three-stage Vanguard satellite vehicle to be tested is one of the third most vital parts of any missile system development at the Convair Central Rocket Co. and the Allegheny Ballistic Laboratories. The 13th Martin Viking rocket built but not yet fired for the Navy's upper atmospheric research will be launching vehicle for the tests. It will consist of the third stage of the proposed Vanguard vehicle in place of the standard Viking upper stage.

The second part of the federation has agreed to conduct a series of tests of the tests carried by the organization in its membership. Among them, publication in an International Astronautical Journal, Astronautics and Space, presentation of a glossary of astronomical terms, preparation of an handbook of astronomical nomenclature and library classification systems.

Preparation for publication of the IAF including the agreement on author and library, is in Bonn, Switzerland.

and the fast and enduring losses would run from them through the way pylons to the third stage.

Weightlessness

Continuing to check reports of unpleasant sensations during short periods of weightlessness were the experiences of 167 subjects who were doses in a Lockheed T-33 for periods of 10 to 10 seconds of weightlessness. Most of the subjects felt pleasant, said Dr. J. C. Denker of the USAF School of Aviation Medicine. Some of the passengers felt sensations of tension, but they were not believed to be pain. Said one: "The weightless condition brought on an easing feeling of well-being and contentment."

I could feel my body relaxing. At times I could feel myself, I think, completely at all my 167 flights.

All care was not lost, though, some of the subjects fought nausea most of the time and afterwards said very fatigued. Concluded Dr. Gerschelhoff: "We believe selected crews of future space ships will be able to perform the daily duties and even carry conditions."

Solar Power

Hydrogen production plants in space, producing liquid or frozen liquid methane, will be the first to be proposed to Keldysh. Also, said at present no change for Convair Aerospace Division.

Such chemical plants would be one means of reducing overall cost of manned space flight. By producing the fuel on a satellite, the cost of leaving projectiles from earth to orbital launching points of space ships would be greatly reduced. The concept is an evolution of solar proposals by Ehricke and others for a systematic expansion into space flight by first establishing a satellite on a launching base and then using a form that can supply the satellite.

Staple cost for such a mission is staggering in view of the requirements for space flight; for example, it would require 700 lbs. of propellant and about 20 lbs. of structure on the cargo section just to take one pound of projectile out in the orbit.

One possible way to reduce overall mission costs is to use lightweight projectiles such as hydrogen. Solar heat could be used in the hydrogen plant as the sole source of power and the operation could be completely autonomous, with only occasional human supervision.

Orbital Corrections

A major contribution to the calculations of orbital motion was made by John D. Clark of Martin's advanced design department. The Vanguard group acquired data on control accuracy

early in the program and that data was related to the guidance and tracking accuracy requirements. Orbital analysis is not the only way to get those requirements and the selected choices would have to produce accurate tracking data 1 hr. later and the changes of the orbital paths. Most orbital studies have assumed restraining factors which usually the analysts do not seriously improve the quality or value of the results. Denker's approach included the effect of the nonconservativeness of the orbit, the drag of the atmosphere, and the noncircular shape of the earth.

Within the framework of these conditions, four basic algorithms were used to derive the mechanics of motion.

A light weight Moon vehicle fired from a Slobot balloon at 7,000 ft altitude was proposed in Kurt Stuhling and R. Foster of the American delegation. Vehicle has three stages: a cluster of solid propellant rockets with a total impulse of 9,718,000 lb.-sec. from the first stage, the second stage is also a solid propellant rocket of 782,000 lb.-sec., and the third stage, also a solid rocket, has a total impulse of 11,000 lb.-sec.

This combination could provide a fast ground payload beyond the second Earth point between the sixth and the Moon. From there the payload would fall to the Moon under the force of lunar gravity.

Shipboard launching at relative zero would not envisioned in a necessity. It also might be necessary to stabilize the separation platform with rockets or flexiblock to guarantee vertical alignment at firing. The vehicle would fire right through the balloon, either components with upper atmosphere

U.S. Delegation

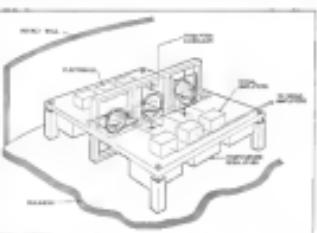
U. S. delegates to the IAF Congress included three members of the American Rocket Society: Andrew G. Holtz, chief of the delegations; Dr. F. Franklin Julian, Hopkins University; Dr. W. E. Lewis, Douglas Aircraft; L. H. Rutherford, Lockheed Aircraft; Keith A. Blodgett, Convair Division of General Dynamics; Dr. H. R. J. Gerscheloff, General Electric; Capt. James W. Miller, II, Experimental Inc.; Donald Russell, Guidance Analysis Inc.; Captain Salvatore Scolnick, AFSC; Dr. S. P. Stover, University of Maryland; and David A. Anderson, Aviation Week.

Delegates of the American Astronautic Society were Norman V. Peterson, Sperry Gyroscope Co. A large contingent of an ensemble of development officers and scientists predominately from the USAF Cambridge Research Center attended the congress. Among these were Gen. L. D. Davis, Drs. Philip D. Morrison and Hollis F. Price and the ARDC European office.

Invitations from Moscow have shown that balloon resonance is as great a threat as deviation of the rocket occurs.

Anderson suggested that although a four-part package was not necessary, it might not get extra effort to develop instrumentation for such a package simply because it allowed the first chance to make the Moon. Perhaps

night orbits presents fire triggering flash or fluorescent powder to mark the impact point on the lunar surface. A single purpose telecentering set might be useful on the way, but it would



Vanguard Guidance

Each satellite orbital guidance element will play key role in establishing orbit. Produced by Minneapolis-Honeywell, it uses three integrating (HIG) gyro's to sense roll, pitch or yaw displacement of East and westward flight motion. Liquid propellant is used to gross roll feed supply, impulsive and servo servos developed by Yakovlev, which shift position of piston mounted rocket thrust chamber to return rocket to required attitude. Changes in rocket pitch attitude, to bring roll drag and satellite into eastward launching profile, are produced and introduced into primary HIG gyro by east torque motor which jetisoned gas in desired rocket pitch attitude. Transient amplifiers, built on MIL circuit, control temperature of HIG gas damping fluid.

but complete and accurate composition.

The scientist searched and studied many aircraft designs about the world and particularly concluded his parallel design. The big difference in this year has been pointed to is the thought that man's best big leap into space is not around the corner. There is much more fine engineering prestige riding in the nose of the Vanguards.

This is space flight versus sea, and outgoing AFAC President Fred Darr said, "This has been the major theme and greatest constraint of this program."

Navy Orders New A3J From North American

Washington—Navy has awarded North American Aviation's Columbus, Ohio, division an \$85 million contract for research and development work on a two-seat, jet-powered fighter, bomber, carrier-based aircraft, aircraft weapon system designated A3J. Procurement probably will be General Electric's J79.

The Navy also expected subcontract to buy prototype, flight and static test models. First stage of the development involved extensive evaluation of the aircraft, including investigation of various configurations of weapons, wing mounted tanks and control planes of design.

The Navy pointed out that its adoption of the "carrier weapon system" for the A3J was a departure from past surface design emphasis and is being used "because of the manufacturer's integration of equipment systems."

Famed Replaces Bell As Bell Aircraft Head

Buffalo, N. Y.—Lucius D. Bell, founder of the Bell Aircraft Corp., announced his resignation as president of the firm last week, and his elevation to chairman of the board. New president is Lorben P. Everett.

Everett, 43, served as assistant to the president-secretary, controller-treasurer, general manager, vice-president and director since joining Bell in 1945.

Bell, 67, entered aviation in 1912 as a cadet. Later he became vice-president and general manager for the Glenn L. Martin Co. of Los Angeles. In 1938 he joined Consolidated Aircraft Co. of Buffalo as vice-president and general manager. He remained Bell Aircraft to 1939.

In another move, Marvin Gaylord, vice-president and general manager of Bell's Helicopter Division at Fort Worth, was elected a director of the parent company. While appointment of the Division into a wholly owned subsidiary became effective later this year, Gaylord is expected to remain president.

Flight Characteristics of B-58 Simulated with Modified F-94

Buffalo, N. Y.—Flight characteristics of Convair's supersonic B-58 Hustler bomber were successfully simulated by Cornell Aeronautical Laboratories, the Air Force and Convair in a modified F-94 fighter before the first B-58 was built.

Convair is also known to be working on such static variable stability aircraft as the F-102A and the F-106.

The B-58 studies were an integral part of a seven-year research program on stability and control which has been sponsored largely by the Air Research and Development Command's Wright Air Development Center.

Avoided Costly Changes

Through the use of highly automated automatic, analytical and electronic computers the F-94 was used to determine performance characteristics of both the proposed control system and the B-58's configuration.

Findings were incorporated into the design, avoiding costly changes in the prototype.

The studies were made by Cornell's chief pilot, John C. Seal, B. A. Frackas, manager of flight for the Port Wkflk. Test pilot of Convair Division of General Dynamics Corp. and chief engineering test pilot for the B-58 flight test program, and an Air Force pilot.



COMPLEX instrumentation in nose section of Convair's variable stability F-94. Forward instrument section contains data recording equipment and large section holds the variable stability simulation equipment. Note small auxiliary section (at left) attached to side of fuselage.

The B-58, which recently was rolled out at the Fort Worth plant (AW Sept. 18, p. 3), is now beginning trim tabs.

Convair and the B-58 team were the first direct subscribers to the aircraft industry's variable stability techniques.

Convair First

Convair first used the technique in 1956 on F-102A. It also has made non-linear servo neutralization on F-105 and in F-106 increased wing damping of an F-106 to improve vertical stability, varied longitudinal characteristics of the F-94 and a B-58. In 1959, Convair applied this to variable stability in a C-45 transport.

In the F-94 and for the B-58 program, the longitudinal control system was selected in great knowledge that it provided wide margins of stability and control effectiveness. Stability was addressed through automatic compensation of the longitudinal derivatives independent of the pilot's actions.

Simulations of the variable stability equipment was a control action for shifting the stick force to match the attitude desired by the pilot for proper control in "feel." Changing control loads at either end of the range of the test plane.



ROCKET-POWERED X-2 was built at cost of USAF, Navy and National Advisory Committee for Aeronautics cooperation effort for flight research. Pilot and co-pilot, the X-2 were manufactured by Bell Aircraft Corp. in Buffalo, N. Y.

X-2 Sets Altitude Record at 126,000 Ft.

Washington—Accomplishment of flight data from successfully controlled flight at altitude of up to 126,000 ft. is being hailed as Edwards AFB's pride.

Early this month the B-57 X-2 piloted by Capt. Bruce Rentschler Jr. is known to be the highest altitude aircraft (126,000 ft.) a record for a manned aircraft. Both the USAF and Department of Defense have refused to confirm the record figure.

However Defense Secretary Charles Wilson admitted last week that the rocket-powered X-2 had exceeded the previous record of 98,000 ft. established Aug. 26, 1954, in the Bell X-1 by Maj. Arthur Morey.

Later in July, the X-2 then flew in Maj. Col. T. P. Everett established a record altitude of 100,000 ft. (AW Sept. 18, p. 3). The design speed of the X-2 is 7,700 mph.

The altitude record is in excess of the 120,000 ft. which the USAF originally hoped the X-2 research plane would be able to attain.

Precise significance of the flight is the successful nature of the X-2 at an altitude of nearly 24 mi. "It was so easy," one report said, "it was no record."

To achieve the collection of other important high altitude data has begun in earnest.

Unfortunately, later flights since the record one have aborted just prior to the drop from a modified B-58 mother plane.

Although the primary purpose of the

research aircraft is the accumulation of high altitude and high speed flight data—none of which is revealed in the altitude and speed records—the Pentagon said, a secondary effort will work to prevent proliferation of the altitude record.

The X-2 was powered by a 15,000-lb-thrust, double-nozzle Convair-Wright rocket engine.

In an open race in July, the X-2 did not reach its design speed of 2,100 mph because of heat problems with the intake fuel pump.

The race with which the X-2 proved its 120,000 ft. target altitude that on this flight there were no difficulties.



X-2A, X-2 powered by 15,000 lb. thrust Convair-Wright double-nozzle rocket engine, now holds both altitude and speed records—126,000 ft. and 3,000 mph.

Aussie Air Imports Total \$23 Million

Melbourne, Australia—Australia's imports of aircraft, aircraft parts and engines, covering the fiscal year ended June 30th, totalled \$22,931,563.

Value of aircraft imported, including helicopters, gliders and airships, was \$7,787,671. Of the amount imports originating in the United States were worth \$7,573,214.

Imports of 220 aircraft, aerostats, aircraft parts, including jet, were worth \$9,560,130. Of these, 87% originated in the United States.

B-47s to Fly Non-Stop From U.S. to Australia

Washington—Three Strategic Air Force B-47s are scheduled to make the first nonstop flight from the U.S. to Australia at November during the third annual Operation Hooligan. They also will visit New Zealand.

The aircraft will arrive with the Olympic Games at Melbourne on time, code blue flight with an R3-B47 Thunderchief jet from the USAF Test Air Forces' 67th Technical Reconnaissance Wing at Bitan, Japan, and a C-124 Globemaster and C-130 Hercules from the 45th Air Division at Tadzhikistan. The 19th AF is flying R3-B47s.

will refuel en route from KC-97 tankers. Should anything go wrong, fuel between the U.S. and Australia and then to Japan. The USAF planes, as part of the Royal Australian Air Force, will fly over 13 cities in Australia, New Zealand and Tasmania and will be in store depots at four cities in Australia and one in New Zealand.

Irvine Asks Industry For Super Materials

Los Angeles—Gen. C. S. Irvine, director of the Defense Materiel Agency, has asked the industry for "dramatically strengthened" materials and instruments to protect the U.S. from being its qualitative experience, as the air force comes up with something revolutionary, something that changes our entire thinking in regard to the use of materials as a whole," Gen. Irvine told a meeting of the American Society for Testing Materials here. "We need to send major breakthroughs all along the line."

Gen. Irvine urged independent sponsored research and development programs, "as recognition of the terrible potentialities of planned and uncontrolled breakdowns in the war," and said, "in the search for checks and new metals, He added.

In just a few years, our extreme industrial needs would be like new sprouts of March 30," he said, with one prediction of March 30, 1960, with ten percent of the area of 10,000,000."

USAF B-52s Grounded After California Crash

Wright-Patterson AFB, Ohio—Maj. Gen. L. M. Marshall Commanded last week ordered the grounding of Strategic Air Command's Boeing B-52 intercontinental bombers as a "precautionary measure" after a Stratofortress caught fire and crashed near Castle AFB, Missouri, Calif., killing five crew members. The pilot and co-pilot ejected and escaped with superficial burns.

Despite the grounding, flights were being made daily and crews remained on a stand-by basis in the event of an emergency. He B-52 was grounded because of damage to its left engine, a type of disorder which had caused the crash of another Castle AFB bomber last weekend.

The aircraft commanded on last week's task, Maj. Benjamin R. Grindell, 4037th Combat Crew Training Squadron, was co-pilot, Capt. William J. Vetter, 91st Bombardment Wing, and they were returning to Castle on a training flight when their compartment filled with blue smoke.

Maj. Grindell opened the escape hatch and he and the co-pilot escaped burning but severely injured. He gave orders for the crew to leave the aircraft and he and Capt. Vetter ejected. He said he landed back as he descended down and saw the B-52 enveloped in flame. It exploded on impact, destroying a farm house.



ROUTE of globe-circling KC-97 mission planned by SAC which will add a major new mission seeking to determine the shape of the earth's magnetic field. Plans will receive scientific from ARDC's Cambridge Research Center on 10,000-mile journey.

Air Force to Map Earth's Magnetic Field

By Evert Clark

Hickam, Maui—Air Force scientists last week began an ambitious three-month, 10,000-mile flight to map the earth's magnetic field more accurately.

A KC-97 Stratofortress carrying a L390-B magnetic field meter took off from Loring, Maine, last week on a flight that will map 99% of the earth's surface in order to refine the earth's magnetic field measurements on behalf of a committee of the National Academy of Sciences.

The project, called "The G-77," is sponsored by Air Research and Development Command through its Cambridge Research Center and the Strategic Air Command and the University of Chicago.

Studies by Dr. John A. Simpson, physics professor and Peter Meier, assistant professor of physics, at Chicago University's Enrico Fermi Institute for Nuclear Studies, have indicated that

the pattern of the magnetic field extends in space in just the same as it is at the earth's surface. The effect of the outer field on increasing cosmic radiation should give a fairly accurate indication of the pattern.

Dr. Simpson and Mr. Meier developed the measuring techniques being used and proposed the flight. Essentially, the two men made 99% of the earth's surface adapted to measure variation and patterns locally produced by increasing radiation.

Project scientist is Ludwig Katz, head of the Geomagnetic Section of Cambridge Geophysical Research Directorate. His staff do most of his travel as a SAC C-134 Globemaster which is being kept stand by the KC-97, carrying equipment, supplies and an extra crew for the KC-97.

John F. Butler, an electronics scientist in the Geomagnetic Section, will make most of the flights in the KC-97. He recently spent three weeks flying in an RB-57 equipped with the same magnetic field meter, taking extremely readings over the United States. The meter is similar to a network of instruments which the Fermi Institute has been using throughout North and South America and was especially adapted for night flights.

The scientists hope to locate the geomagnetic equator precisely and determine its relationship to the geographic equator. In addition to increasing understanding of the outer magnetic field, the flight should provide information helpful in planning satellite launches and other plans for the International Geophysical Year.

India Orders 25 Folland Gnats

London—Indian government has placed an \$11.4 million order for an initial quantity of 25 Folland Gnats lightweight fighter-bombers, launching a bottleneck that threatened to postpone the design to obviate forced beneath official ordering and red tape.

The Indian order had been hanging for all summer over an initial order sent between the government and Folland not reached on the Gnat deal. The Indians failure to sign a firm contract had to considerable speculation that Britain's sales efforts to peddle MiG fighters had disrupted the Gnat deal.

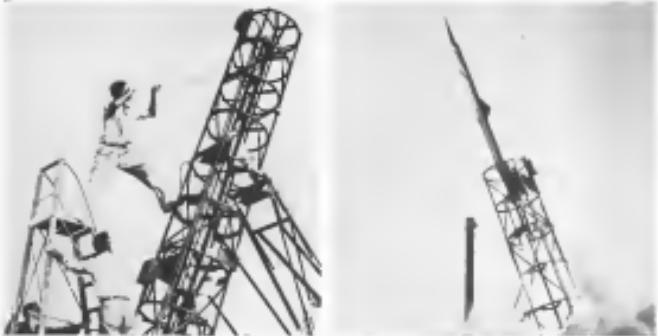
The Gnat contract signed in May, V. P. Bhatia, Indian High Commissioner, calls for an initial production of 25 Gnats, with rights to continue production in India under license.

In addition to the Indian order, Fol-

land has a contract from the British Ministry of Supply for 10 Gnats, of which the first is in the now completed, to placing ground crews and spare parts, training, maintenance and development of the Gnat design for a firm Royal Air Force order (AW Sept. 17, p. 23).

Several other foreign countries are extremely interested in the Gnat but have held off purchases until the sale was broken with an initial order large enough to insure a reasonable price per aircraft production.

Meanwhile, authoritative sources in London say the Russians have offered the Indians the Badger supersonic bomber in a follow-through sales campaign on the basis of the British and Indian political note India by the Russians during the Bulgarian Kirovets visit.



Hypersonic Rocket

Wright Air Development Center's Hypersonic Test Vehicle (HTV) spent flight and reentry as it is fired from 160-ft launcher. Test version (left) propane vehicle for firing. Model was developed by DAPL and Aerophysics Development Corp., a Convair-McDonnell sub company. Other experimental models already have been fired and tested at Holloman Air Development Center and design of moving model-launcher. HTV is reusable, less than long, fired from portable launcher. It reaches 5,000 mph within two seconds of launching.



CESSNA 620 BUSINESSLINER makes out-of-jetset runs from McConnell AFB, Wichita. Price for about 20 hr flight time:

Cessna Unveils Model 620 Transport

By Erwin J. Bellon



NEW INSTRUMENT CONCEPT is designed for optimum readability under different conditions. Radio, navigation controls are on right of approach panel; flight deck is to left of center. Each engine can be completely rotated by flipping one lever (top).

Wichita—Cessna Aircraft Co. will begin producing its new four-engine pressurized 200 mph Model 620 business plane early in 1968. Deliveries will begin late in 1968 at a price of \$375,000. The company has already signed an sales campaign on the 9 to 11 passenger executive transport with an option bonus last December. One factor attracting business customers and pilots who switch to the airplane is the availability of a choice of paint colors.

Marketing Manager Frank Morris gave the following air performance figures on the Model 620 that were substantially improved over earlier frequent flier aircraft sold by the company:

- Top speed of 282 mph at 15,000 ft.
- Maximum cruise speed of 250 mph at 20,000 rpm at 12,000 ft.
- Takeoff over a 50-ft obstacle at 15,000-lb gross weight at sea level with max capacity of 10 passengers 1,300 ft.
- Landing distance at 15,000-lb gross weight at 14,284 ft over a 50-ft obstacle at sea level is 5,850 ft.
- Maximum rate of climb at 15,000 lb at sea level is 1,250 fpm; at 15,000 lb the 620 will climb 1,310 fpm.
- Maximum range at 15,000 lb at 100 mph power is 1,700 mi; endurance at 50% power is 100 hours. Fuel capacity is 537 gal.
- Four-engine operational ceiling is 25,000 ft on three engines and at 14,000 ft, the engine for a service ceiling of 20,000 ft.

Figures Are 'Conservative'

The 620 weighs 10,000 lb empty, then includes provision for 275 lb of electronic equipment.

Performance figures are given in Cessna's estimate, but sources close

to the manufacturer say that they are on the conservative side. The company will hold up no defiance, and until flight tests are completed and then presented, guaranteed figures.

Powersplants are four Continental G80-570-A six-bladed horizontally opposed supercharged and gear actuated propellers with exhaust intercoolers rated at 350 hp each at takeoff at 3,200 rpm at sea level with maximum continuous rating of 310 hp. Cruise altitude by MET/O power is 15,000 ft at 1,800 rpm. Thus blade count allows feathering Hormel propellers of 93 in diameter as fixed. Variable pitch blades are offered as optional equipment.

The \$375,000 price includes a stand and carriage of five passengers, seats and a folding table. Cessna will provide buyers with a catalog of interior furnishings.

Cessna will be restricted by standard class not used.

Wing during landing and takeoff, which are of the Goodrich Instastatic high pressure pneumatic type, and passengers oxygen are extra. Optional equipment includes window shades, increased power steering, a Collins integrated flight recorder and a transponder.

Pyramidal Concept

The Model 620 falls into the panache of mid-Century design, an overall concept of the aircraft's styling, not a matter of the broad base of tail or the ends of the wings or the deep base of the fuselage. At the top of the pyramidal shape of the fuselage, light planes at the red level are thousands of light hours. At the top of the pyramid, perched is a smaller fleet of heavy types, beginning with the Beech 18 and DC-3. Can



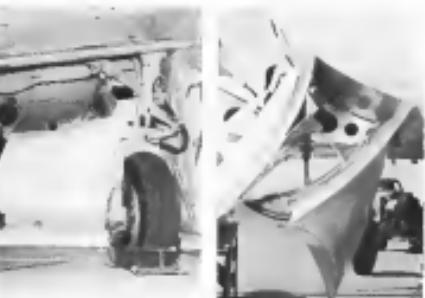
FRONT DOOR leading into an fast logic cabin will have retractable steps to save space.



FLAT CONTINENTAL ENGINES are especially designed to allow easy clash of instruments.



NOSE AND MAIN LANDING GEARS (left and center) are designed and built by Cessna. They have Goodrich 125 psi tires destined to 57.70 psi. Antiskid brakes are optional; a power nose wheel steering. Rating (right) retracts when access door is closed.



use Liner and as well as some DC 6s. Until now, Convair has been broad represented in the lower layers of the market, and the 630 represents an effort to cover the entire market place field of aircraft powerplants of known global type aircraft.

Sources close to the company say that it will offer the Model 630 to the military services for use as an official transport and as a multi-purpose powerplant for navigation, radar and communications. Several foreign actions have indicated interest in combinations prop/turbo or prop/turbo versions for both these applications.

The Model 630's specially designed Aeronautics gear system will provide easy and convenient loading and unloading of cargo and equipment with the capacity of 8,000 lb. altitude to 18,000 ft. The aircraft will have the air plane at 15,000 ft. The 630 will complete its mission by landing the aircraft plane as far forward as possible or as far back as possible a source of electrical power to make the 630 independent of external power sources by driving a D.C. generator. The airplane has 34 V, 30 amp generators on each engine and on the fuselage.

News Digest

Lockheed Aircraft Corp. received a \$20 million order for production of T-33 jet trainers on a fixed price contract. The order represents the largest single T-33 production in the past four years. It will bring the total number of T-33s to nearly 5,000, well exceed production rates in the previous two and 1958.

Navy ordered approximately \$200 million worth of Chiricahua 9400's from Convair. First flight of the new aircraft from Farnell 1957. Delivered to Fleet Air Warfare Jet Test Station, Chiran, has been in quantity production since September 1957.

Martin Co. will build a new plant, primarily for missile research and development, on a 10 square mile site recently purchased in the vicinity of Patric AFB, USAF Missile Test Center near Orlando, Fla. Martin already is scheduled to test and launch the multistage Vanguard satellite missile from Florida. By Martin-torched missile also was tested out at the center.

Nease 600 dollar contract for seven kinds of Lockheed T-33s and F-86 jet aircraft was awarded Aircraft Designing & Manufacturing Co., by USAF AFMDC, subsection of Tussaudson Corp. of Colorado, measured expansion program nearly doubling size of plant in Orlando.

General Aviation Facilities Planning

Group retained management consulting firm of Shaw, Allen and Associates to determine facilities requirements of General Aviation during next 20 years. Study will include analysis of volume needs, 10,000 new general aviation airports in U.S.

Aerospace Manufacturing Resources Division, Inc., and Western Union Telegraph Co. purchased 90% interest in Wind Tunnel Instrument Co. Inc. at Norman, Okla. Each of two owners will receive \$10,000 shares of Wind Tunnel stock under terms of transaction that involves a total of \$400,000.

Conversion of Far East Air Force to North American T-100 Super Sabre will begin in November when the first fighter aircraft for FEAF's 30th Fighter Bomber Squadron at Inbase, Japan, arrive. The T-100 will be the first aircraft to provide a source of electrical power to make the 630 independent of external power sources by driving a D.C. generator. The airplane has 34 V, 30 amp generators on each engine and on the fuselage.

Ryan Aeroplane Co. earned \$13,023,841 for work on the aircraft Job 11. Net profit of company after taxes was \$12,999, equal to \$1.44 per share.

General Dynamics, fighter aircraft manufacturer, received an order from the Royal Australian Air Force for 120 aircraft under a reprocurement order this year. Report a unit profit of \$413,307 after taxes for the first year ended May 31, 1959, with a gross revenue of \$22,378,735 for the period. Highest in the company's earnings history. Total cost amounted to \$16.85 a share.

Hunting Avocation Festival Jet Pavilion on Council for demonstration with the RCAF after successful evaluation trials with the RAF.

United Aircraft Products, Inc., of Dayton received first in a series of contracts which will total approximately

\$5 million for its durability, cold weather oil system and hot fuel pumping system for the Boeing KC-97.

Brown Aerial Survey of Pasadena, Calif., and the American Air Map Makers Agency, world map experts, provide continual liaison for Photovision cameras during various aerial photographic or mapping surveys in that country.

KC-135 followers orders have gone to Ryan Aeroplane Co. for \$12 mil. low worth of fueling surfaces and to Lear Jet, General Electric Division for automatic flight control systems to cost \$1,900,000. Ryan also has 700 jet fueling surfaces contract from Boeing.

On March Engineering Co., Glendale, Calif., has been licensed to manufacture and sell spare parts for Douglas B-26 aircraft. On March operates an adapting B-26 bombers for civilian use.

Tusconian Corp., of Colorado, holding companies for a group of enterprises known as Tusconian Air Lines with a reprocurement order this year, reports a unit profit of \$413,307 after taxes for the first year ended May 31, 1959, with a gross revenue of \$22,378,735 for the period. Highest in the company's earnings history. Total cost amounted to \$16.85 a share.

Continental Air Lines with second August passenger revenue of \$1.5 million declined a dividend of 12¢ cents a share payable Sept. 30. The August income figure was 16% higher than that for August 1958, and topped Continental's previous monthly high of \$1,325,000 in October 1958.



Whirlwind Landing

British Westland Whirlwind equipped with flotation safety units can engage-off landing during extreme load tests at Colchester. Subject to a maximum working pressure of 14.3 lb/sq. in., pressure will withstand a test pressure of 12.3 lb/sq. in. A steel sheet about 11 m. in diameter is fitted into one of each pressure test unit to provide protection for test load landing.

a New 400 CYCLE MOTOR

with integral gear box
for use in missiles and
jet aircraft



EMCO Type R-600 is a compact, light weight 400 cycle, 3 phase motor with an integral gear box that weighs only 11.25 pounds. It was designed by GEMCO specifically for use in missiles and aircraft. It has a maximum torque of 1.25 lb-inches and meets MIL-T-1633 (ASG) specifications. Weighing only 11.25 pounds, it has a continuous output of 2.75 HP or 2140 RPM at no load. The power factor is 0.75, while the overall efficiency of the unit is 76%. Mounting flanges are made of Spec. A36-20,000.

A feature in the design of GEMCO Type R-600 is that the gear box is mounted directly below the motor, thus eliminating the need for a separate support which places the motor at approximately the center of gravity of the missile or aircraft. This enables the designer to utilize the entire cross-section and width of the missile or aircraft to withstand the extreme shock and vibration requirements of aerospace aircraft and missiles. With minor alterations, the motor can be used with split-phase and single phase power.

Type R-600 is another example of the line continuation found in all GEMCO products. GEMCO's entire effort is confined to the design and production of linear and rotary actuators and special motors of high output, light weight units. Many of the latest jet aircraft and missiles being developed or delivered today by GEMCO products are also used for industrial applications where precise control movements are imperative.

**Designers and producers of motors,
linear and rotary actuators... exclusively**



technical bulletin

SPECIFICATIONS OF GEMCO TYPE R-600 MOTOR

Motor:	110 volt, 400 cycle, 3 phase
Load:	170 lb-in. at 2140 RPM
R.P.M.:	2140 RPM output at gear box
Power Factor:	0.75
Overall Efficiency:	76% no load and at very low speeds
Weight:	11.25 lbs. net weight and ship weight
Dimensions:	Type R-600 may be made salient and ship weight with minor alterations

**Electrical Engineering
and Manufacturing Corp.**

4412 West Jefferson Boulevard
Los Angeles 16, California
Telephone: Hollywood 3-6150

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A compact, completely sealed switch for use on landing gear, flaps or other exposed locations.



Selection of the proper switch to meet any aircraft application is simplified by the wide variety of switch types—cylinders, stems, actuators and electrical characteristics.

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Illustrated are but a few of the hundreds of the precision switch types **MICRO SWITCH** Engineering has developed to meet aircraft design requirements. All are ruggedly housed or sealed against environmental changes and extremes. It pays to bring your switch problems to **MICRO SWITCH**.

Sealed subminiature switch
The smallest lightweight switch of this type available. Gross weight 0.075 lb. in temperature between -40°F and +140°F.



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AIR TRANSPORT

Collins 'Radar Cocoon' to Protect Aircraft

By Philip J. Klass

Development of a self-contained airborne proximity warning system, which will alert crews to potential radar echoes around an airplane as it moves through the sky, will be the first phase of a two-part Collins Radar Co. program aimed at fully automating air-traffic collision avoidance.

Collins expects to begin flight tests on a prototype proximity warning system (Phase I) in January 1958, and hopes to start production by September of that year.

If aircraft airplane penetrate this warning system, the proximity warning system will catch a warning signal from the aircraft's own transponder and a panel indicator will show the approximate bearing and distance to the intruding aircraft. During VFR weather, the pilot can thus look for the intruder, decide whether he presents a collision threat requiring evasive action. In IFR weather, the pilot will have to make the decision solely on the basis of his hearing distance information as he waits for radar avoidance information to be available.

In the second phase of the program, Collins will develop a collision avoidance computer which when added to the proximity warning system, will automatically determine whether the on-boarding aircraft represents a collision threat. If it does, the computer will indicate which direction the pilot must turn to avoid the threat.

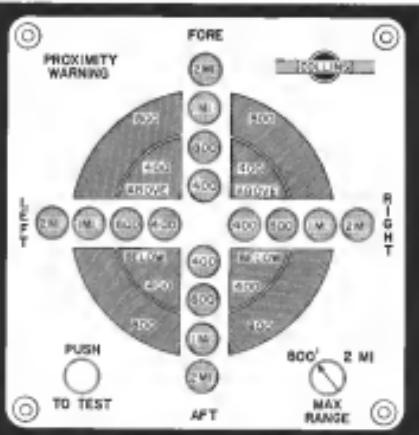
New H-Works

Design of a computer to determine automatically whether a collision threat exists is considerably more complex than the proximity warning task. Research and analytical studies into collision problem dynamics will be carried out by Collins concurrently with the development and design of the proximity warning system. Among numerous difficulties, Collins must take into account quantities of the collision avoidance computer available by December 1958.

Depending upon the quantities of proximity warning systems ordered by the airlines and business aircraft operators the system will cost the airlines around \$67,000. The Collins road-race company will cost perhaps another \$3,000 according to present estimates.

The proximity warning system is expected to weigh about 15 lb. and occupy a one ATR size case, exclusive of an antenna and panel radiators.

The heart of the Collins radar is a



quency modulated (FM) continuous wave (CW) S-band (3,000 mc) radar. Collins selected FM-CW as preferable to pulse-type radar because of its ability to operate at extremely short ranges. The CW output frequency will be at 900 cps in synchronism with the aircraft's own 400 cps air power supply.

Six wave rotating feed horns (antennas) will be employed to provide the horizontal beam beam around the aircraft. The four horizontal, expandable air detector horns will be arranged so that each covers a 100 deg azimuthal quadrant (see sketch p. 58). Each horn will be integrated and connected to a radio receiver and level detector, following which the test signal will be measured.

Upper hemisphere, expandable air detector horns will be arranged to detect the presence of an aircraft within an 800 ft. radius but unaffected by aircraft passing 1,000 ft. above. Lower hemisphere, providing a similar 800 ft. radius of detection, below the aircraft.

A line-of-flight, providing 360 deg coverage is available 74 deg above and below the plane of flight and extending to a range of two miles in high density terrain areas; pilot can reduce this line-of-flight azimuth coverage to an 800 ft. range to prevent needless false alarms.

If possible, the free-fall horns for generating upper hemisphere and line-of-flight (vertical) coverage will be mounted atop the vertical stabilizer for optimum radar vision.

Continuously Excited

The four line-of-flight antenna horns will be arranged so that each covers a 100 deg azimuthally quadrant (see sketch p. 58). Each horn will be integrated and connected to a radio receiver and level detector, following which the test signal will be measured.

The two hemispherical horns antennas will be continuously excited and monitored by two independent radio receivers.

A radio echo from an intruding aircraft will serve to detect its presence. The phase shift between the radio radars



SR. William F. Hiltzik, Director General of IATA; Juan T. Trippe, president of Pan American and retiring Delta president; and Leo Daugherty, PAA chairman and new IATA president.

pilot position reporting procedures

• Early development of internationally accepted and compatible criteria of standard order.

• Standard longitudinal separation minimum and priority reporting in areas where navigation facilities permit.

• Regulation of all aircraft movements by air traffic control system at all times in congested areas.

• Anti-collision lights on all craft.

• Standard rules so that aircraft may be permitted to get closer than 500 ft to another for military identification or any other purpose.

• Development of altimeters that can provide accurate measurements at high altitudes.

• Make a detailed study of weather, movements and building patterns for current equipment applicable to air.

The technical committee she called for a basic reorganization of traffic control methods as an area often less than a route, and for it to end to its boundaries political boundaries for our traffic. Such boundaries, if valid, have been made unnecessary by present aircraft speeds.

Looking to future traffic control system requirements, the committee noted that "the increasing need and density of traffic will require a systematic increase in the speed of local connections and in increasing number of decisions in the part of pilots and operators". The committee warned that the situation in North Atlantic traffic is going to cause control problems by not utilizing the available capacity. "No radical improvements can be expected until significant additional range range, which may take decades and involve a total present effort to plan and point-to-point connections cannot be imposed."

Before this we cannot anticipate any significant reduction in the large proportion of airways around each transoceanic aircraft. We must therefore

rethink the role of the runway air head, divide our visual lighting running the length of runway, and use positive controls, such as lights now coming up. •

• Runways required for jet transport operation will not pose serious construction problems as anticipated earlier. The committee noted that, over the present airfield pattern, big jet transports will take off at full gross weight have only a few major international transoceans. Most airports will not require special new runways for jet operations. Rather than lengthening existing runways in anticipation of jet operation, the committee recommended the construction of straight, elevated runways to the east of the present airfield pattern so that transports can be steered after takeoff. These will require much less expensive construction than runways.

Runways and taxiways whose weight capacities are suitable for present heavy aircraft will also be able to handle jets because of the load distribution of four-wheel dual landing gear and surface wear and landing characteristics. •

• New inspection techniques will be required of aircraft to allow properly the new airframe design philosophy being incorporated into the aircraft structures. The new inspection techniques will be able to detect early and frequently structural failures generated by the fatigue damage, they will be able to take advantage of its surface. It is recommended more efficient application of current inspection techniques and thorough exploitation of ultrasonics and radiographs in preventing failures.

Fare Adjustment Necessary

Edinburgh—An extract from the 12th annual general meeting of the International Air Transport Association. But fare changes in the international airline fare structure are a necessity preliminary to the successful opening of the jet air transport age.

Indication of the emergency is the sharp decline in airfares with an absolute minimum fare which often closes, re-filters or disappears.

K. G. Gourville, commercial director of British Overseas Airways Corp., who presided over IATA's Comes traffic conference here, said that the therapeutic rate structure is already operating in the Middle East and will soon be extended to the North Atlantic.

Gourville warned that many problems resulting from the Comes conference will become acute by the time the conference opens next September. He said:

"Unless we are able to find a solution to this problem, we may find ourselves in need of a rate cut, the risk of one rate offer after the other, through the loss of flight hours and rates rapidly once systems freeze to the programme."

Leo Daugherty of Kirtland, chairman of British Transports Airlines, pleaded for less severe short-haul airfares of competing airlines at meetings for the negotiation of a new rate structure for the jet age. "There is, he said, 'something rather embarrassing about the fact that reductions of industry have already started a series of meetings to discuss levels and consider the operational problems of the jet age, whereas our own share of increased problems of the jet era have only been mentioned grudgingly in dark corners.'

"Are we not overwhelmed about the responsibility of keeping strict on our financial position? Would we not do better to put all our costs on the table instead of continuing to hold our commercial costs so closely that we can hardly see them ourselves?"

Reduction Planned In Reserve Air Fleet

Washington—The number of aircraft allocated to the Civil Reserve Air Fleet will be reduced during fiscal 1959, as a result of the Thorson Judgement, it is estimated by the Defense Air Transport Management Administration.

The revised allocation, based upon recommendations in the Industry Allocation Advisory Committee, calls for 155 four-engine transports in 1959 as compared with 369 in fiscal 1958. The aircraft are earmarked for assignment to the Military Air Transport Service upon 48-hour notice in the event of a national emergency.

Aircraft participating in the 1958 CRAT program represent 35% of the airline fleet participating in the program.

The 1959 CRAT will represent 32% of the commercial flight for that period. However, because of increased load capacity of the same aircraft, it is estimated that total CRAT will consist of approximately the present level.

In addition to the 1959 fleet, 35 or 40 aircraft designated as contingent reserves will be available to replace lost aircraft.

Hughes Hopes to Lend \$10 Million to TWA

Washington—Hughes Tool Co. plans to provide Trans World Airlines with \$10 million in standby credit as soon as funds are received by the Civil Aeronautics Board as approved.

TWA is asking the Board to approve the agency's order which Hughes would give \$10 million standby to the airline. TWA could borrow against the credit April 30, 1958.

CAB approval is necessary because the terms of the Board's 1944 order specifying the separation of control of TWA by Hughes. When it approved the Hughes-TWA contract, the CAB found no transgression between the two companies, each with \$10 million in credit.

Now, the second time since the year TWA and Hughes joined the Board to agree to a merger exception to the rule, Los Angeles, the companies requested approval of a deal in which Hughes would lend jet transports and all 25 of them to TWA [AW Mar. 23, p. 41].

The CAB scheduled a hearing on the jet transport proposal, but Hughes indicated that it is postponed. No further action has been taken on the plan.

The new credit proposal would allow TWA to borrow up to \$10 million from Hughes on unsecured notes. Repayments would be in multiples of \$100,

000, and the loans would bear interest at the prevailing prime rate for commercial loans in New York.

The usual amount of the credit would be \$10 million. It would be reduced to a \$7.5 million maximum on Aug. 1, 1957; to \$5 million on Nov. 1, 1957, and to \$3.5 million on Feb. 1, 1958.

Dallas Case Limited To California Routes

Washington—On November Board had decided a transcontinental route can fit the time being and has confined the Dallas-to-West Coast route to routes between Dallas and California.

The decision to limit the case was made on a split vote with CAB voting 11 to 10 and G. Joseph Moretti, federal representative of the case, voting in the case. And flights serving California routes that would now serve Dallas with applications included in the case by Board Aircraft Contractors At Large, Delta Air Lines, Western Air Lines, American Airlines, California Eastern Airlines, Eastern Air Lines, National Airlines and Trans American Airlines.

Disagreement with the Board's ruling in the case was focused around several filed applications which would have expanded it into a panhandle transcontinental route and would have included service to the Pacific Northwest and north south service along the West Coast.

As its conclusion order the Board directed to limit the case to routes to California.

Report Favors Transport Census

Washington—Commerce Department staff group has found that the long-delayed census of transportation is needed in all 31 air routes to properly evaluate transportation statistics.

Reporting to the Secretary of Commerce, Louis S. Rothchild, Under Secy. of Commerce for Transportation, recommended that the Bureau of Census seek congressional approval of a \$1.2 million transport census to be conducted in 1958.

Rothchild's staff found that non-airline transportation statistics are scattered in the conduct of the various economic, as well as to the administrative and legislative processes of the government, and the group found strong support in privately available data.

To fill these statistical gaps, Rothchild recommended a 1953 program consisting of three surveys:

- Commodity distribution by land and water;
- Passenger travel by land, air and water;
- Truck transportation, unitizing and utilization.

proposals for new service between Dallas and California to ports in New Mexico and Nevada.

The order left a loophole by saying that the airlines would have a chance to consider on the merits of getting an application in, the case, a matter of economic but incomplete granting of one of the delayed applications if the airlines with rejected applications could prove that the Board would have to expand the case.

The CAB majority said that the transcontinental question is whether additional Dallas-California service is needed and that expansion of the case would make that case.

The Board decided to postpone final service order applications from the case and voted to require a mandatory stop at Dallas on air flights from the east and south operated over new routes in the case. And flights serving California routes that would now serve Dallas.

Airline with applications included in the case by Board Aircraft Contractors At Large, Delta Air Lines, Western Air Lines, American Airlines, California Eastern Airlines, Eastern Air Lines, National Airlines and Trans American Airlines.

Disagreement with the Board's ruling in the case was focused around several filed applications which would have expanded it into a panhandle transcontinental route and would have included service to the Pacific Northwest and north south service along the West Coast.

The routes are designed to apply information in the transportation in documents contained in the various statistics now published in the government. This will measure the rate of the various industries and the markets in which they compete in which they operate.

A census of transportation was first voted for Congress in 1948 to be conducted in 1949 and cited for two years thereafter, but was denied. With the start of the Korean conflict and the outbreak of the Korean War, the census was delayed.

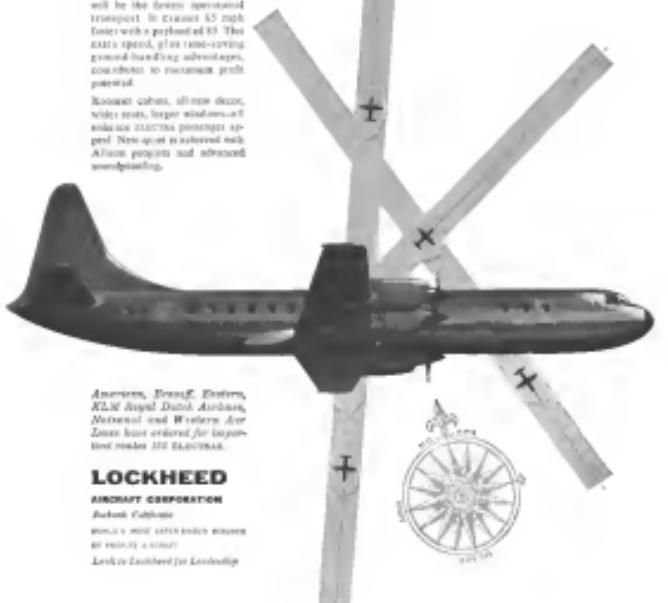
The last study is now complete, and Rothchild has recommended that the Bureau of the Census make another attempt to secure funds for a transportation survey.

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CAB Reports on TWA, Riddle Northeast, West Coast Accidents

By Gary Lewis

Washington—The Civil Aeronautics Board has issued reports on accidents involving the crash of Trans World Air Lines Douglas Northeast Air Lines and West Coast Airlines.

The TWA and TAA accidents were fatal crashes in which both aircraft were destroyed. West Coast and Northeast's accidents involved only minor injuries to passengers and crew.

TWA's accident occurred at Pittsburgh last April when a Martin 404 crashed and burst into flames after impact. The crew of 2 and 21 of the 31 passengers were killed, but high fuel burn.

Immediately after takeoff, the pilot was the left engine. There was no light vision, and he cut the left throttle so that the engine whose anti-shuddering was deactivated.

He then switched for the left manual feathering position, but the rudder shaking that anti-shuddering was still active delayed the pilot from pulling the manual feathering button and tried to pull anti-feathering by pulling his, the left mixture to idle control.

The cockpit was a TWA line check captain who was line-checking the pilot, a first officer, for captaincy.

The CAB found that this sequence of actions failed to comply with among other provisions prescribed by the code for preflight for a failure. The investigation showed that the fire was caused by failure of an exhaust component stamp which triggered a fire detection unit.

The procedures followed by the two pilots resulted in a winding left propeller which, along with extended landing gear and tailfin flap, produced enough drag to make the airplane lose altitude and crash.

The CAB said the cause of the mishap was "inadequate emergency action in the very short time available to the crew, which produced an infinite configuration with unacceptable drag."

Riddle

The Riddle transport, a C-46, crashed in a field near Hollister, S. C., last December while on a scheduled cargo flight from New York to Miami. Both pilots were killed.

The CAB investigation determined that the C-46 descended below it lay the ground, with the right outer wing, the tail surfaces and the left engine nacelle separating from the aircraft in flight. Downward failure of the right

wing was the first in the sequence of structural failures.

The CAB report said numerous communications were found on the clearance for control of the aircraft, as well as changes in communication frequencies.

The Board said the Civil Aviation Authority Administration and the air traffic should have detected the parts which did not conform with regulations.

The Board found that erratic action of non-functioning elevator control valve caused the C-46 to pitch down suddenly enough to cause the right wing fail.

West Coast

The CAB found that a West Coast Airlines DC-3 crashed at Buffalo Niagara Airport last February between the pilot abandoned his approach too late to avoid a hard nose-in.

The accident occurred during an approach to the Buffalo, N.Y., airport Feb. 26, about 1740 PST. After the pilot began to execute a second approach, the DC-3 lost a left engine and one-quarter miles northeast of the runway had nosed into a snow-covered field.

The cockpit and two of the 12 passengers were safely ejected.

During the approach to the runway, visibility was reduced to zero for about 10 seconds by a snow squall, then the

snow lights were ignited again. When the lights were obscured for a second time, the pilot started a raised approach procedure, but before the airplane started to climb, it hit a hill about .60 ft from the east. The CAB said the nose-up attitude of the DC-3 relieved the force of impact substantially.

The Board said the cause of the accident was "the combination of a landing approach followed loss of visual reference due to the airport and the delayed attempt to execute a raised approach."

Northeast

Last March a Northeast Airlines Canadair C-46 landed at drop nose to the left of a runway at Portland, Maine Municipal Airport. The nose gear collapsed, damaging the engine. Five of the 12 passengers suffered injuries.

A row of airport boundary lights running parallel to the left end of runway lights faded the illusion with the Northeast crew that the runway was to the left of its actual position. Landing at night, in high nose, and with limited visibility, the pilot set the C-46 down in deep snow to the left of the runway.

The CAB report found that the first approach to the right end of runway lights was incomplete and that the three green threshold lights were not all fully opaque. These conditions contributed to the illness.

The CAB blamed the accident on inadequate maintenance of runway lighting and weather reporting at that early time by the airport management. An ice explorer was referred for more reporting of lighting conditions.

New Argentine Airline To Operate Abroad

Buenos Aires, Argentina's capital, has been formed with private capital for foreign and domestic flights.

This became possible only recently with the signing of the country's new aviation law, which rejected Aerolineas Argentinas' monopoly on intra-Arentine flights and opened the way for other firms controlled by Argentine nationals.

The new firm, Transair, Inc., a U.S. state corporation with capital of \$2.2 million, will begin operations April 1, 1956, with 10 Douglas DC-3s. It will begin flying to New York, and expects to inaugurate service to San Francisco, with connections to the Far East.

Super-Caravelle (114011) will make the international flights. The six, free air zone, aircraft are to be based at a first purchase rights, from California Eastern Airlines, Inc. with the help of the Bank of America. Purchase price was \$2 million dollars.



Business Aircraft Radar

Smallest light-weight, short-range radar for aircraft, weighing only 50 pounds, has been developed by Radio Corporation of America. New radar, which weighs about #0.5 in much shorter range than 50 mi range reported to 150 mi. For airline version. Several other companies, including Collins Radio, reportedly are developing lightweight weather radars.



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ATA Official Pushes Program For Blanket Air Traffic Control

By Katherine Johnson

Washington—Miller Arnold, vice president of the Air Transport Association, has urged that planning and research be kept under way to develop a system that would blanket the continent, or as soon as practicable, traffic control.

In testimony before the House Committee on Interstate and Foreign Commerce, Arnold told Congress he "believe[s] that the present federal air traffic control system is not adequate to meet the needs of the nation."

Under the present plan, positive control would be provided to more than 15,000 ft.

"It is the strong feeling of the airlines," he said, "that a system of controls over traffic control must be developed to provide separation and expansion of all traffic regardless of whether conditions except in certain specific areas, permit [it] or not. At the altitude at which the present system of traffic control no longer takes charge, handling is still not done without greater and greater loss than those who feel that they are being deprived of so-called freedom of the skies."

He anticipated, however, that the system can be applied "without causing any undue hardship on private flying."

No Areas Exempted

Arnold and other members of the airline industry have given a step further than Arnold with the suggestion that no areas be exempted from the controlled system.

Other developments of the hearing included:

- Louis Rothfelder, Under Secretary of Commerce for Transportation disclosed that the administration will recommend a plan within the next future for reorganizing traffic in future federal airports de-cluttering.

- Arnold reported that the Association of Automotive Engineers and several other groups are working on redesign configurations designed to increase the ease of pilot visibility.

- American Telephone and Telegraph Co. proposed to license its Tacan jet engine to fully utilize production of Vinten and other manufacturers of Tacan units. Vinten units, Rothfelder told the administration, will cost between \$4,000 and \$5,000 each.

Airways Charges

The two rate cases on airways user charges have not yet been decided, Rothfelder said. These are

eight-hour night flights with no scheduled launch at ten pounds. If this is an expense to a user at rates now, about 15% of all traffic is controlled, what are we to expect if practically all traffic is to be controlled?"

Pan Air Buying DC-7s With PAA Financing

Rio de Janeiro-Brazil's Superintendence of Commerce and Credit officials approved request by Pan American Airways to buy four DC-7B aircraft with a price of \$1,17 million.

Transocean will come from Pan American World Airlines which owns 40% of Panair stock.

Panair now has 10 DC-4s, Constellations for flights from Brazil to Europe and the Middle East, and to other South American countries. The new planes will take over the long, European and Middle Eastern flights allowing the company to use its Constellations for "local" flights around South America.

SHORTLINES

► Aer Lingus' London-Dublin traffic registered a 20% increase in August for a total of 78,000 passengers. This last month's overall traffic reached 550,000 passengers, 150,000 more than was flown in August of 1951.

► Air India International will start a new Australia service on Oct. 5. The Singapore-Chennai service will operate via a week between Bombay and Delhi via Madras, Singapore and Darjeeling and will connect with Air India European flights for through services between Madras and London, Darjeeling, Rome and Paris.

► British air traffic control now looks toward disaster, Arnold observed. "An enormous disregard of our safety is such flight," causing numerous restrictions on flight operations. If proper equipment were explored, we could decrease the required distance per aircraft yet maintain the same level of safety."

Immediate Steps

As far as promotional steps are concerned, Arnold proposed:

- Additional aircraft. He noted that although the Civil Aviations Board has authorized additional aircraft services in many cities, the aircraft operating in these cities have not been properly equipped.

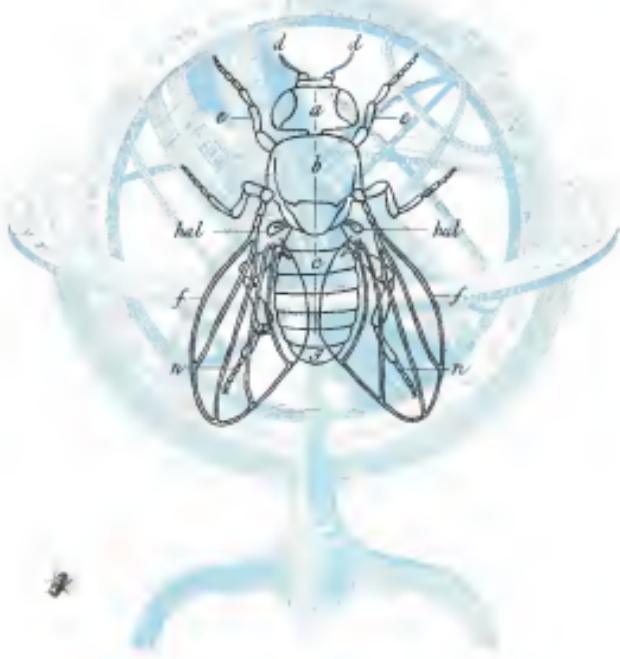
- Additional control tower personnel in anticipation of expanding airport activities. Deploying for low visibility and unusual tower operations Arnold recommended.

The present and vision of the work is for the physical and mental health of controllers who are assigned a straight

► Allegheny Airlines flew 4,692,000 passenger miles in August in 117 intermediate stops. En route, the airline served 11 cities in eight months of the year totalled 42,600 passenger miles, a 16.4% increase.

► Chicago Helicopter Airways, formerly Helicopter Air Service, completed its first year of scheduled operations last month. The carrier handled 21 rail road projects of wind and completed more than 47,000 hr of flight time in the seven month period.

► Delta Air Lines has put its first Convair 440 Metropolitan in service. Delta



Two-Hundred-Million-Year-Old Inertial Navigator

Each side of the fly had two sets of wings. His second set of wings shortened into the vibrating gyro-stabilized cell balancers. The fly now flies with his two instead of four wings, efficient enough for his needs and marvelously compact. Our interest is in the anatomy of the fly in

the interest of an inertial guidance system. Engineers have invented inertial guidance systems. Those bearing the Latin adjective have a propensity for design and ingenuity incorporated in this complex field. They are designed to function at Mach Numbers that are classified.

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but how many of the radio-equipped transports are enroute

► Ethiopian Airlines has increased its services to Cairo and Athens from five to six flights a week. The airline now operates three Convair 240s along with six DC-3s.

► Hong Kong Air Transport Ltd. is negotiating for four Boeing 747s worth \$100 million each. The carrier has retained one Bantam and is taking options on two more.

► Melrose Airlines is adding a lounge to its Convair 240s but increasing capacity to 72 seats. The modification is the first step in a program that will eventually increase capacity to 80 seats.

Melrose carried 32,676 passengers in August, an increase of 25.8% over August, 1959.

► National Airlines opened a sales office in Houston on Sept. 18 to prepare for operations over the new Houston-New Orleans route. The Civil Aeronautics Board is giving the airline

► South Central Airlines' August traffic totalled 56,867 passengers.

► Northwest Airlines now offers co-planetary patents to passengers on Seattle-Honolulu flights. Showcases rule the picture with Polynesian culture while developing remuneratively.

► Clark Air Lines handles major reservations for Cebuano Central football games through its Iloilo offices. Last year 10,000 spectators attended an arm of the 45th Midwestern other than Cebu, soccer. The local carrier has personally done the same thing for the St. Louis Cardinals, Chicago Cubs and Cleveland White Sox baseball teams and the Chicago Bears football organization.

► Pan American's Latin American Division will fly 4,500 passengers and their wives to the Dominican Republic, July 24 for the Federico-Quesada Corp. Federal Quarantine is avoiding increased Caribbean vacationists in ports as far south as Argentine companies, and Pan American will do 70 round trips between the U.S. and Central America in a ten-day program. Latin American Division reports summer traffic was up 17% over 1958.

► Raleigh-Durham Airport Authority reports 3,931 passenger implants in August, up 10% over the same month last year. The authority's gate is 130,000 passengers handled in 1958.

► Yang Airlines of Brazil has signed an interline agreement with Civil Air Transport of Hongkong.

AIRLINE OBSERVER

[Editor's Note: The following column was written by the Airways Writer and aviation law writer for the annual general meeting of the International Air Transport Assoc., Edinburgh.]

► The most annual general meeting of the International Air Transport Assoc. will be held in Madrid next September.

► Some is changing a set and larger version of its Convair jet transport aimed at larger capacity, more speed and increased range. It will still be known as the midrange jet transport class, however. New Convair Convair Japan engine series in which the percentage of liquid fuel is higher than in current versions.

► British airlines and engine manufacturers made unprecedented sales efforts at 12th IATA annual general meeting, with the ultimate of these two achieved and sales promised, a full schedule of substantiation for the IATA delegates and others in the Neverland general version of a Convair 880 and the British 300-passenger Britannia. For the first time in recent IATA meetings, U.S. manufacturers' efforts took a definite back seat to British salesmanship.

► British Britannia's entrance into BOAC service has been delayed another six months until spring by the maximum of static rating problem at the Proteus turboprop engine, causing engine failures. Latest forecasts due to major ring cracking damage, such as Gälenta numbers during BOAC proving flights to Australia. Problems so often around aircraft as soon as power plants as certain as those of engine. British is departing another test Britannia on African ring flights with television cameras on board to monitor engine's static load to show what actually happens. Other testing conditions on vibration and fatigue in the cabin. Royal Aircraft Establishment at Farnborough and British National Gas Turbine Research Facility also are being called in to aid British in finding a quick solution requiring minimum modifications of the engine and static structure.

► Sales battle between Pratt & Whitney JT3 and Rolls-Royce Conway appears to have the hottest series of the jet-transport market competition. Rolls has a 14,500-lb-thrust version of the JT3B-1000, and Pratt has had JT3B running at 16,000 lb thrust for several years. Neutral observers are hoping that Rolls won't beat the Boeing on Douglas transport engine market to no degree outside England and Canada.

► Reasons delaying of top Aeroflot officials caused French official clearance to visit Soviet in early October. The technical discussions concerning the Concorde jet transport. Russians have been asking for six months that they are extremely interested in buying some Concorde for Aeroflot operation, but the French government delayed official clearance and recently Concorde as present version is priced in 10,000-lb thrust Rolls-Royce Avon Mk. 29 turbines.

► Vickers is considering design of new four-jet, medium-range jet transport based on four Rolls-Royce Conway mounted either in wing pods or in a cluster at the rear of the fuselage. British European Airways already has submitted a bid and a bid does not mean the project to compete with the Franco-Concorde at the London-Near East and other high density European routes. Key to Vickers decision probably is the Trans-Canada Airlines offer for fifteen medium-haul transports. If TCA will buy the Vickers medium-haul jet, there is a strong likelihood that the project will become a reality.

► Airlines are spending whether there will be no airfare be between Aristotle Onassis' reorganized Greek National Air Line and United Air Lines. Presently, angles would enable United providing technical assistance in expanding the Greek air lines' international operations plus feeding U.S. domestic traffic into the Greek Islands routes to New York.

AIR-TURBINE DRIVES . . .

The Answer to Jet Age Accessory Power Problems

The need for hydraulics, electric, and mechanical power multiples with every advancement in aircraft performance. The logical answer is to generate more hydraulic power for pressurization, cabin heating, and cooling. Whichever form of auxiliary equipment has priority must limit aerodynamic requirements. The blinding surfaces heat of high performance planes only compounds the problem. Not only does today's designer plan an over-size system that can meet increased power requirements, he must keep space, but he must be sure it can operate in low temperatures.

Some auxiliary equipment such as air is easily afforded by heat. Heat drives installed for engine, hydraulic power drives, and gas turbine power units (GTPU) are extremely valuable in high ambient temperatures. In addition, they generate so much heat in operation that a method of removing the heat must be employed. Other limitations such as inadequate lubricants, heat pumps or the absence of extremely high temperature metals may preclude the use of these methods of thermodynamic requirements continue to grow.

Heat Problem Changes The Design Picture

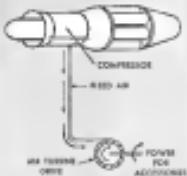
The heat problem has become so complex that top engineers now realize the importance of integrating this auxiliary system as part of the power plant and airframe design effort. In the shadow of adequate wings at relatively high skin temperatures, designers are at the advantage of installing thermal conditioning equipment and conduct as part of the airframe design in order to cool surface areas as well as internal components.

As a reliable, renewable source of energy, the jet engine provides the key to solving this problem. As extracted from its compressor, it can be directed to nearly every part of the aircraft surface for purposes of cooling, boundary layer control, and deicing. Since the weight of this equipment is negligible in the air craft mission, it becomes practical to use the massive energy source—uncompressed air—for operation of the plane's entire auxiliary systems.

Air-turbine Drives Permit Integrated System

The trend calls for importance on the

size and selection of various accessories. With a compressed air supply already integrated with the airframe, the use of an air-turbine drive is the most effective integration of the aircraft and the auxiliary equipment. In many installations, the same air used in the existing aircraft system can be used to spin small turbine shafts mounted on shafts. These, in turn, drive generators, hydraulic power pumps, thermal-conditioning equipment, thermal-control actuators, and other accessories.



Basic Air-turbine Drive Component

The operating losses of such new integrated units is less than in the B-52 aircraft. This single, compactly integrated system can now supply auxiliary power and reduce the aircraft's overall weight and power requirements. In many installations, the same air used in the existing aircraft system can be used to spin small turbine shafts mounted on shafts. These, in turn, drive generators, hydraulic power pumps, thermal-conditioning equipment, thermal-control actuators, and other accessories.

Install Where Power Is Needed



Air-turbine Power Generated Locally

Air-turbine drives and the accessories they operate can be located anywhere on the plane where power is needed for the B-52, for example, an hydraulic ram pump is distributed on both wings and the fuselage—close to the point where power is needed. Such results, however, location is possible because an air-turbine unit is relatively easy to transport and because it requires no external system.

Extracted away from the engine, these drives can contribute to a slender airframe design as could any engine-mounted auxiliary drive. In the proposed system, however, there is one clear-cut "service area," the hydraulic and pneumatic transmission lines can be used. This results in a lighter and less complex system.

These advantages permit a significant increase in aircraft speed and range, or payload.

Forecast for the Future

Burst and Nuclear Powerplants. It is expected that air-turbine drives will play an increasingly important role in the future. In aircraft utilizing a turbo-compressor

the turboprop portion of the engine may be shut down during the supersonic portion of flight. This would mean that no auxiliary fuel power would be available from the main powerplants for necessary operations. A pneumatic system, however, could provide auxiliary power under such conditions.

Another solution that more necessary power will be needed in the future exists in the anticipated requirement for nuclear-powered aircraft. Large amounts of power may be needed for operated functions associated with the reactor. Essentially, liquid-cooled auxiliaries, linked with an auxiliary power unit, could supply a large block of power without a prohibitive increase in unit weight or size.

G-E Pioneered Air-turbine Drives

General Electric's Aircraft Auxiliary Turbine Department in Lynn, Mass., is one of the nation's prime suppliers of air-turbine drives for small auxiliary power.

Drawing on G-E's own experience in producing electrical and aircraft gas turbines, this department has considerably advanced the state of turboelectric power generation.

Just as General Electric pioneered the "turbo-super" turbocharger in 1938 through the Aircraft Auxiliary Turbine Department, it is now building an air-turbine driven equipment to answer the auxiliary power problems of the jet age.

G-E Turbopump and Turbo-drives help supply of hydraulics and electrical power on the Boeing B-52 Strategic Bomber, first aircraft in history to use pressurized-air power equipment for operating its many auxiliary systems.

Extracted away from the jet engine, G-E turbines and generator drives supply 15,000 of 2650 psi and 90 kips of 800 rpm, respectively. They give the big bomber power for operating steering, control surfaces, landing gear, hydraulic systems, radar, lighting, and armament.

G-E Fuel Turbosystems

This fuel-mounted, air-driven unit provides 60 gallons of vapor-free fuel per minute, giving North American's F-86D an increased fuel load needed for efficient air-turbine equipment. Units with extremely high power to weight ratios are already in advanced stages of testing. These programs promise powerful energy to necessary power requirements that lie dormant in the aircraft.

G-E Turbostators

Another application of the versatile turbine is in the self-contained turbostator used in the Martin B-57 which uses a jet engine to move 10 tons of fuel. It is powered by hot air resulting from the combustion of an oil-methane combustible solid propellant cartridge. Turbostators eliminate the need for ground power starting until maximum engine problems, and increase jet aircraft availability.



G-E Turbopump and Turbodriven Help Power B-52's Auxiliary System



G-E Afterburner Turbosystem (West North American F-86D Interceptor Jet Bomber)



G-E Turbosystem (Boeing B-57) (Continued)

Advanced Air-turbine Drives Are "In the Works"

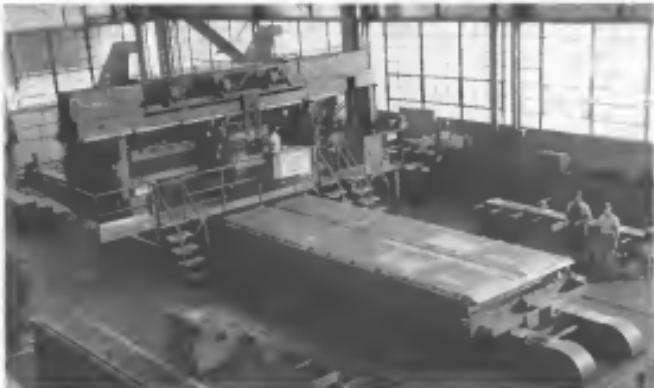
General Electric's Aircraft Auxiliary Turbine Department, with facilities valued at some \$25 million, is carrying on an extensive development program on advanced air-turbine equipment. Units with extremely high power to weight ratios are already in advanced stages of testing. These programs promise powerful energy to necessary power requirements that lie dormant in the aircraft.

To find out how G-E air-turbine equipment can help you now in the jet age, contact your General Electric Sales Office or write for the descriptive literature on the drives you are interested in.

Second Electric Gas Turbine Aircraft	GE-4144-A
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GE-4144-H	GE-4144-H
GE-4144-I	GE-4144-I
GE-4144-J	GE-4144-J
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GE-4144-U	GE-4144-U
GE-4144-V	GE-4144-V
GE-4144-W	GE-4144-W
GE-4144-X	GE-4144-X
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GENERAL ELECTRIC

PRODUCTION ENGINEERING



HUGE SKIN MILL at Lockheed is one of type of machine just which will be used to stretch, taper and cut integral stiffeners in structural components of future aircraft. Machine also may be tape-controlled.

Air Future Taxes Production Methods

By Irving Stone

Burbank, Calif.—Advanced aircraft design engineers in the next decade will be the engineers of the manufacturing test to transfer, then may need hardware. Some of the factors involved are:

- Projected sharp rise in military aircraft production rates, which will require use of high strength steels and titanium alloys. These materials may early well be harder to work, will introduce nonferrous complications.
- Reduced aircraft space for armament during development.
- Increased machining and forming requirements.
- More precision in tooling fabrication and assembly.
- Clean process control.

These and more other considerations will combine to burden manufacturers with problems demanding, for their solutions, new approaches to well-established methods of existing production techniques.

New levels of technical skill will be required in every phase of manufacturing. Manufacturing research will take on new importance. Closer co-operation between manufacturing and engineering groups will be required.

Manufacturing will require a high degree of qualification testing in addition to adequate bench testing.

Also technical personnel will be required, specially trained in the arts that are installing or checking.

In connection with improved installation methods, a new type of sheet metal equipment employing the shear in addition to stretching. Coordinated concentrators with the stretch phase, then will be used to simplify clamping and even problems.

Machining

More machining is generally seen in the picture for future aircraft because of emphasis on weight reduction and integral stiffening.

Shift to sheet and trimmable alloys may substantially reduce costs for some cutting operations, particularly for thin sheet materials. But it requires more power and speed. Machining and coolant suppliers must have to be accustomed to particular materials to avoid contamination.

Magnetic or punched tapes are to be used for control of cutting operations instead of mechanical methods now employed. If production quantities warrant, but this new technique would still complicate the production job because



COMPRESSION-FORMING principle debt steel here for C-section, is being considered for bending pressure bars and ducts in future aircraft. Two sets under right, to be installed at Lockheed next year will be used for difficult variable angle profiling of solid sections, such as forged etc. Cincinnati Milling Machine Co. is building the units designed by Lockheed under USAF contract.

of the specialized training the operators will require.

With application of modern aircraft will mean more extensive machining of boron/carb. in sheet and aluminum alloys as well as aluminum alloys.

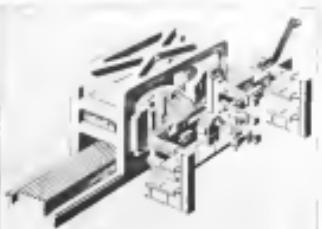
To withstand cutting forces, support methods with sufficient rigidity will have to be developed for the cases.

Machining Load

The use of extruded integrally stiffened skin instead of adapted or tapered sheet will tend to lessen the machining load. Also, abrasive belt grinding and chemical etching will find greater application to replace or supplement conventional methods of sheet metal machining the sheet in detail in integrated. Coordinated concentrators with the stretch phase, then will be used to simplify clamping and even problems.

Higher forming pressures generally will be required, particularly for sheet and titanium alloys. Load on tool drops will be heavier because of increased material thickness and decreased tolerance of tools to the required wall thickness of border materials. Shops will require more grinding equipment and generally heavier machine tools.

High volume forming using explosive or power, is seen desirable for

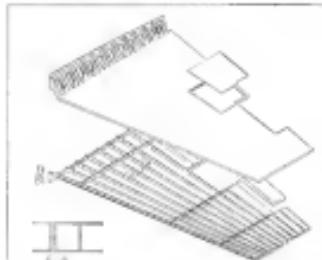


mass parts and assemblies for some of the border areas. This will introduce difficulties in clamping tolerances. There will be an incentive need for secondary forming operations to set formed parts to exact position.

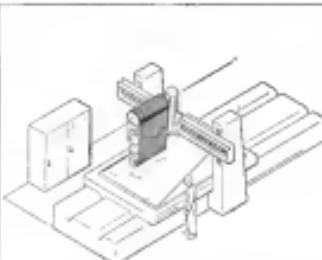
Most of the forming operations such as those for titanium alloys and steels, will have to be performed at elevated temperatures adding the complexities of heating to the production job and requiring adequate framing of personnel.

Higher forming pressures generally will be required, particularly for sheet and titanium alloys. Load on tool drops will be heavier because of increased material thickness and decreased tolerance of tools to the required wall thickness of border materials. Shops will require more grinding equipment and generally heavier machine tools.

Concentrated heat forming will be done on plates, rings and discs from sheet materials, sheet and metal. Compression forming will be required to mold stiff flanging, and some forming will have to be done at elevated temperatures. Pressure dies will have

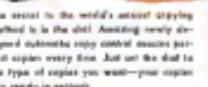


PROPOSED WING structure (left) forged as two half shells would reduce assembly operations, but would require drilling of holes and machining or grinding of mating faces and outer contours. Proposed abrasive belt grinding activity might use this proposed automatic contour grinder (right) to smooth wing.



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TRAVELING CONTROLLER atmosphere, vertical furnace is being installed at Lockheed for heat-treating steel to high tensile strength for present and future requirements.

to be pressurized up to the material yield strength at lower fatigue life, requiring development of long-life and hard angles to compare, but changes of shape under yield pressure load.

Surface finish of titanium edges is estimated at 250 RMS, or better, on some parts with shot and erosion "dove" requiring harder blanking tools than aluminum alloys. Hardening of hardened edge will be required.

Processing

Precise control will become a more important aspect of the production cycle. Generally all processing will be space closer controls involving non-torsion recording and control measurement in many cases.

Some subtractive new processes will be used, and use of other processes extended, including vapor heating for polishing steel surfaces, chemical milling for steel plates, and some types of cold rolling for sheet steels. Some new processes for sheet steel parts finish systems, requiring plasma or elevated temperatures, gas plasma, principally for body parts for plastic parts had similar for sheeters, surface shot peening, both the forming large parts and for controlling surface residual stresses, with some parts control our rate and intensity of peening there is no safe limit.

Sheet hills may be required for proper closing and packing of titanium alloy.

Vacuum or inert gas atmosphere will be required for heat treating to reduce oxygen absorption which will have to be reported in the furnace and during quench. In the heat-treat cycles of some materials temperature drop to -100°F will be applied.

If infiltration applied and light transmission properties can be reduced

high temperature transparent platings moves and advances probable will be developed.

Transparent Parts

Ultraductile transparent parts will be made of heat and shock resistant glass or possibly fused quartz. A large share of the work to develop and produce transparent parts will have to be performed in the plane holder's engineering and manufacturing laboratories.

Increased emphasis will be put on fusion welding by joining sheet or bar titanium alloy. Both refractive rings must go and suitable inert gas welding equipment will be needed. Be aware, there may be a considerable amount of fusion welding for major assemblies. The welding requirement may have to be placed in a large proportion of the overall area.

There will be some hearing with steel and titanium alloy particularly in sandwhich construction using honeycomb cores. Braising will be done in furnace or with gas and probably will require continuous recording and control instrumentation. Sputter coating will be used to prevent migration of parts in the furnace and to control porosity during cooling or quench. Some selective surface treatment techniques will be used probably including spheromachining. X-ray, wet explosive, surface or the beam

Bonding

Use of metal to metal bonding will receive considerably as a process. It is believed, as a secondary method, as a secondary method as a composite with sections of titanium, and as a sealant.

Much of this bonding will be applied to large assemblies such as fuselage panels or hulls, perhaps even to com-



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plane ways. Because of this it is probable that bonding skills used heretofore will have to be diversified through consideration of some of the factory aids. Additional training in bonding techniques will be required.

"Use of bonded methods construction with homogeneous or similar rate resins will also be required. This will increase the production load of the cleaning of the usual as a preparatory step, will mean more bonding and more work with shade glazes," Minamurtha said.

"Adhesive materials with greater heat-resistance will be introduced, raising temperatures and pressure

Tinning

Tinning will become easier because of closer tolerances being more easily to hold. More supports and pressure will have to be put in stops holding bags, and locations to retain the part more securely so that it can be enclosed to close tolerances as assembled to closer fit. Newspaper sets

Ams will have to put more pressure into the larger sheetfed jobs. Sheetfed circuit boards must be constructed with optical tooling will enable the producer and inspector to have dimensional tolerances magnified for work control purposes.

With increased emphasis on surface smoothness there will be more rigid requirements for accurate contact and

elimination of steps and gaps. Also, in materials having harder they will be less susceptible to fatigue and more resistant to corrosion. If considered, assembly fixtures will have to generate precise, uniform, controllable and repeatable bonding features. Fit of parts will have to be tested before attachment is made.

"Increased emphasis on fatigue-resistant, dual safe structure and weight reduction will effect configuration of parts and number and location of parts and splices. Splices will be parallel to direction of major loading rather than the most convenient direction for assembly. Lengthened, stronger and class sizes developed, will reach lengths up to 75 ft.

Tooling

Automation in pricing machines may be tape controlled, of predictor equations wherein, Minamurtha said. While the world speed assembly, it will involve new data processing skills. The training process can also provide for low, high-voltage or high-frequency equipment.

Hole preparation for riveted and bolted joints on the fuselage outside will require new approaches. Header drill, nutsert and different joint configurations will be needed. Instead of drilling, high velocity pecking of holes may be done in some areas.

For sealing, flat surfaces, sealants will be used which will reduce extrusion



Eight Cuts on Two Wings

VERSATILE BOEING MELTING MACHINE developed by Convair California division of General Dynamics Corp., here is doing job efficiently from points on each side of two F-105A wings at a time, while other computers simultaneously makes four cuts in top and bottom edge of leading edge skin on two wings.

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in the part. These sections will require casting at temperatures up to 2000°. To increase fatigue life, some parts will be heat-treated or treated even though no strength is not required.

In the future, magnesium will be more on the fabrication of parts rather than assemblies. Monolithic diecastings will apply to achieve small components such as the F-114 winglet and to large parts, as would be found in transport structures, which would be used as single pieces to minimize assembly operations.

Metallurgy

The metallurgist will be more closely associated with quality control aspects of manufacturing because of new strength requirements for metals in future high performance aircraft.

Die casters with which he will be concerned will be the trend toward higher heat treating.

Small errors in heat treatment will impair strength characteristics considerably, Monolithic and.

Other important considerations, he adds, will be the determination of the effect of various forming procedures on the integrity of the metal, and whether conventional methods being developed in the elimination of surface residual stress with the shot peening process.

Subcontractors, too, will have to develop higher skills in keeping with the demands of new production techniques. This will be a natural progression as it has in the past, but involving various periods of indoctrination.

New equipment also will have to be acquired by the subcontractor, the more so in the prime contractor would have to get if was doing the work in its own shop.

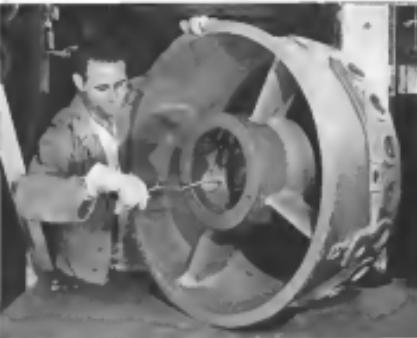
Half-a-Million Pounds Of Beryllium Bought

Half-a-million pounds of pure hard beryllium—lightweight, violent neutron-shielding material—have been bought for defense over the next five years from the Beryllium Casting Refining Co. Beryllium has properties which are unique in combination with high strength, for example, a density which is half that of aluminum, or one-eighth that of gold.

The metal is one of three principal researches considered in moderation and reflector design in nuclear reactor design. The others are graphite and bismuth.

The metal has high resistance to corrosion and a high modulus of elasticity in addition to its light weight. It is used as a reflecting shield material in boron neutron fission in nuclear reactors without absorbing them.

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READY-TO-INSTALL POWERPLAX FOR AIRPLANES

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Napier Spurs British Rocket Operations

First details on three new British rocket engines developed by D. Napier & Son Ltd., London, Britain's increasing effort to produce rocket-powered operational aircraft and guided missiles.

Two of the engines, the NRE 11 and the NRE 12, are shoulder mounts, specifically designed for guided missiles. The third, NRE 3 Scorpion, is a long-life propellant design for ramjet aircraft.

All three types have been extensively flight tested in aircraft and missiles.

Scorpio Details

The Scorpion was intended for use as the proposed next generation of RAF fighters planned to be powered by a supersonic ramjet engine and ramjet rockets. One such combination is the de Havilland Gnat Jr. turboramjet and the DGI Spectre.

A Scorpion installation was demonstrated at Farnborough this year as an auxiliary power unit mounted on the rear of the fuselage of an English Electric Canberra. First engine starts were made in May that year and were followed by a series made over a wide range of altitudes.

Other Rockets

First major production engine passed the NRE 11's two-stage 3,000 lb thrust test operating in hydrogen peroxide and kerosene. The engine was capable of being started and stopped and either thrust level could be selected during flight. Even thrust rating has not been given but the maximum value was over 3,000 lb.

Production began on the motor in 1952, with deliveries started in June of the experimental motors and test vehicles at that time.

Further development of the power plant resulted in the NRE 12, a similar rocket engine using the same bi-propellant combustion. It uses monofuel combustion chamber and nozzle, which

is a design improvement making for greater simplicity. Napier says this motor can be produced in less than half the time of its predecessor NRE 11, and is lighter and more compact.

Thrust rating is presumably the same, at 3,000 lb.

Napier rocket work extends over the last six years. Several types of rockets have been developed and tested by the engineering teams at Napier's Flight Development Establishment, Luton. The rocket test installations there include facilities for proving out system and subsystem components as well as complete powerplants. One major feature is an underground test hall where complete missiles can be run up before firing.



STATIC FIRING of an experimental Napier rocket engine on a test stand at the company's test site at Luton shows the close base and close stalk dimensions characteristic of good combustion. Scale indicates a height of order of 3,000 ft.



NRE 11 ROCKET ENGINES scheduled for shipment to the missile proving ground in Woomera, Australia, were first Napier production system. These units are liquid-cooled, double nozzle, 3,000 lb-thrust missiles in two stages.

A major contribution to basic rocket engine design was made by the team to an extensive series of development tests on combustion chamber cooling systems and nozzle heat generation. Research is parallel was conducted on nozzle exits, hypergolic and control valves.

ROHR



NRE 12 ROCKET ENGINE is a redesigned NRE 11, shortening the existing engine because of advances made in nozzle combustion chamber and nozzle design. Content the improvements and decreases of the engine with the earlier NRE 11.

PRODUCTION BRIEFING

Connected Blvd. Balboa Ctr., 407 East St. New Haven, Conn. will sell samples of three new Kell 1 distancer control cables to all who write in their telephone number. Kell 1, developed by the M. W. Kellogg Co., is claimed to resist swelling and deterioration in P-4 and 5 fuel and Kell 1

P6M

This is one of the most important and exciting aircraft in the world. It is the new Martin SeaMaster, the Navy's first multi-jet attack seaplane. It is now in production and soon to be in fleet service as the spearhead of a powerful new arm of the naval arsenal—the Seaplane Striking Force. The SeaMaster's importance is a matter of inevitability: It is in the over 600 mph class, with a normal cruise altitude of 40,000 feet, an unrefueled combat radius of 1,500 miles, and is operable in "Sea State 3" (waves averaging 6 feet) with a payload of 30,000 pounds. Thus, the endless runways of this world's oceans, lakes and estuaries provide unlimited and indestructible bases for SeaMaster operation, making it the first aircraft of any type having global striking power, independent of fixed installations. *For virtually the whole of our habitable world is within flight minutes of open water!* This new aircraft development is another powerful reason why the U.S. Navy offers to the military enlisted one of the most exciting futures in the world today.



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flat-towed fabric will withstand 400°F for extended periods.

Cessna blows fine abrasive grit through stencils to etch inspection symbols on parts as thin as one mill of the bus. Portable "mag" reader tools on sheet glass, Masonite, porcelain, stainless steel and plastics. It is made by Jim H. Mathematics & Co., 3721 Fisher St., Pittsburgh 13, Pa.

Scully-Jones and Co., Chicago, just type other jetters quick, can place entire aircraft of spinned heat gear blanks. The main jets are set striking up from the after's shoulder wings.

the blank's spheres and the assembly is locked in place while the work is going on, thus ensuring the parts to ride true. James H. Mathematics has made the spinned slots. The Fred G. Haugh Co., Libertyville, Ill. says that the new after has increased their production 10-15%.

Consolidated Diesel Electric Corp.'s Canadian subsidiary, Consolidated Diesel Electric Corp. of Canada, has opened its headquarters at Barrie, Ontario. Can Diesel of Canada will manufacture ground support equipment for jet and rocket aircraft.

Bridges Corp. of America, P. O. Box 9122, Northeast Sta., Newark, N. J.:



claims that its heavy-duty repetitive riveting will yield wire diameters to 3/8 in. I.D.

American Beach & Machine Co., Ann Arbor, Mich., has designed a nucleon set-up for automatic brushing of 180



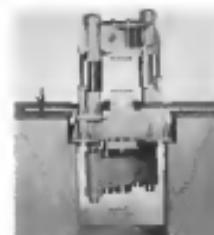
parts per hour. American Beach says they have designed this intense pull-down machine for maximum holding capacity.

"Synchro-Shear" welder, which runs the electrode extension as it makes the weld, is being introduced by the Therm-



an Electric Welding Co., Lynn, Mass. The company reports that all sizes now handled by conventional flux-cored welders can be handled by "Synchro-Shear."

Two-thousand-ton hydraulic forging press designed and manufactured by



Lake Erie Engineering Corp., Buffalo, N. Y., for Hughes Tool Co. and Corp., Denver, N. Y. The single action press makes 30 forgings within 30 minutes.

Flighter Fabrics Inc., New York City, has opened a new glass fabric finishing plant at Clinton, N. J. Bigelow Specialty Glass Division has submitted an order worth \$1 million to New York City to Amsterdam, N. Y.

Australian Sea Venoms Grounding Modified

Melbourne-Royal Australian Navy has conditioned world's first grounding under fire in the Harrier Sea Venoms. Flight test flights of its newest aircraft carrier HMS Melbourne (AW Sept. 5, p. 14).

Tests at the Naval Naval Air Station of the Royal Australian Navy had revealed no serious mechanical defects, but the acceptance of flight deck duty is conditioned on a forthcoming series of land-based flights and trials to prove the complete effectiveness of the riggers.

Further investigation will be carried out to determine whether

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New Upholstery Material

For Use in Helicopters

Trilok, a new three-dimensional upholstering material, is now in use

marketed by United States Rubber, a long and extensive air New York Airways 12-passenger S-55 helicopter (AW Aug. 17, p. 40).

The material is used on the seats, along the longitudinal panels, and later on insulation between the passenger and the seat. It is also used on the cabin with ceiling and floor and can be one of the lightest or weight around

padding qualities and padding ability.

The material, made of carbon fiber and polyethylene wires in a double end-to-end to clean, the company said.

that of stainless steel. After machining, parts can be heat treated to typical ultimate tensile strength of 185,000 psi.

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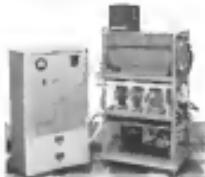


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Maintenance Trainer



George Vought maintenance trainer built to teach Navy men some workings of F4U Corsair. Driver resembles parts of damaged airplane mounted in refitted nose bays on trailer. Pilot trainee can seat in Norden Air Torpedo Training Classroom at Memphis, another is planned for Pacific Fleet later in year. Seated male trainee were required to carry 14 carburetors, largest unit is three-section carburetor assembly measuring 21 ft. in length. Wherever possible seats are made from actual parts of F4U as personnel can never fully visualize cockpit. Seats include whole cockpit electrical system, leading gear and steering gear, fuel system and engine controls, air conditioning system, wing fold, variable camber wing and leading edge slats, speed brake and retract park, hydraulics power system, electrical power system. Fuel system and engine control circuit include engine indicating controls so that start, engine run and shutdown show on panel. Each of seven train has provision for instructors to introduce "trouble." Top picture shows lead ing gear and steering link and bottom, cockpit section.



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Festral air couplings for the Navy's new P4M-1 SeaMaster, saving 75 pounds in coupling weight over the "X" version. Each SeaMaster attack seaplane uses Janitrol high-pressure, high-temperature couplings on bleed air ductwork... for many reasons beyond the weight reduction alone.

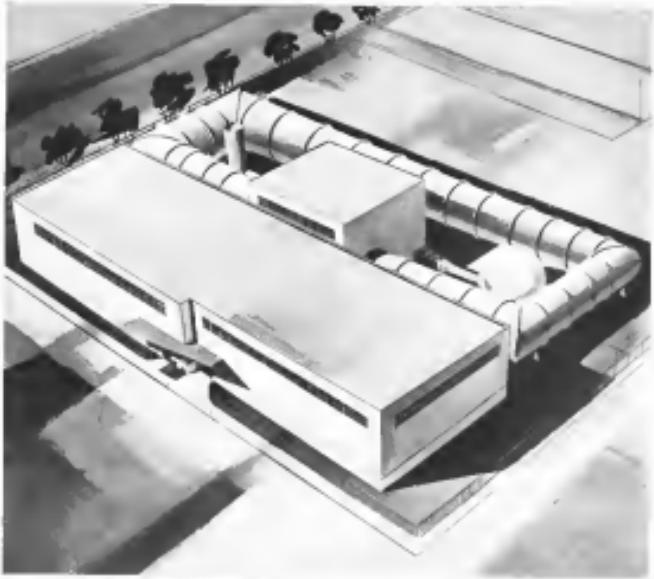
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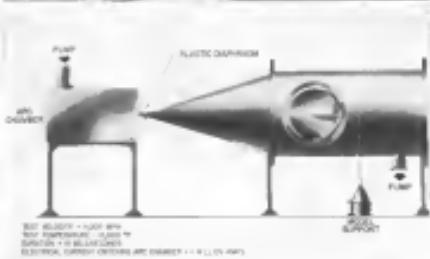
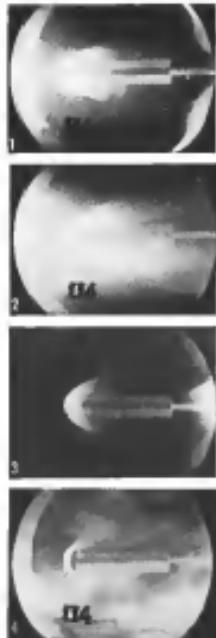
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Hot Shot Wind Tunnel Hits Mach 15

First patient of Arnold Engineering Development Center's Mach 15 Hot Shot wind tunnel shown here (second model and largest of the new USAF test facility) had its first flight at Tullahoma, Tenn., on Aug. 17, p. 31). Hot Shot uses the technique of a model of capaction across an air channel to hold a diaphragm and send a relatively linear downstream hypersonic blast past a small model.

The strip of high speed motion picture film (7,000 per sec.) shows the left column strip the model's response to the 10 milliond-lb blast. The air flow stops just as the model's sonotated nose on the first frame, comes to peak velocity of 11,000 mph, which produces 13,000 ft-lb of shock envelope

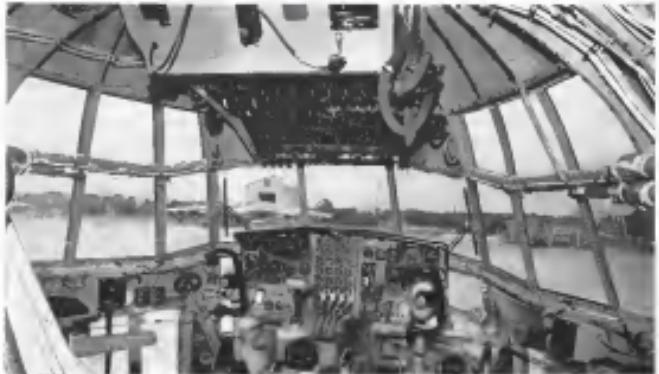
in the second frame, begins to level off, spreads laterally in the third, and ends with the nose of the model still glowing in the fourth.

The researcher in the upper right hand portion is looking at another model; both panels are shown since the air tunnel develops heat as it goes rapidly down in shock-tube types of hypersonic tunnels and is preceded by a longer, more uniform flow in which solid data can be recorded.

The hypersonic freight is being used to explore possible methods for cooling the surface of missiles and aircraft as they encounter speeds which are well up on the slope of the thermal barrier.

The tunnel was designed and built by ARCO Inc. The operating contractor is the Texas ARDC/USC center.

Arnold engineers claim that the de-



C-130 pilots have NESA® windshields for good visibility

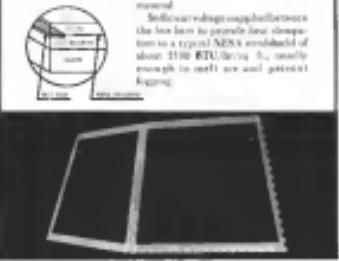
Lockheed's C-130 Hercules is the Air Force's first turboprop transport. It is built to fly higher and faster or lower and slower (and more economically) than any existing military transport. The cargo compartment is much larger than a standard cutback freight car. It will carry about 20 tons of cargo.

This is truly a worldwide replacement and must be ready to fly at all sorts of weather. NESA Flexglass® electrically heated windshields were selected to protect the pilot against the hazards oficing and fogging. Televisions are so close that individuals are directly interchangeable between different models.

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This is NESA. NESA is a transverse, electrically conductive coating applied to hot glass as it comes from the furnace. Electrical energy is delivered to the NESA surface by feed-on bus bars located on opposite edges of the glass. A sensor wire which readily conducts static electricity sensing element is present on each of the outer-edge panels.

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AVIONICS

Vortac Catches Industry Off Balance

By Phillip J. Klass

Distant early warning equipment (DEME) by the newly adopted Vortac name and integrated system is slated to become available from one source sometime late next year and at least two other suppliers hope to have Tacon compatible (inter-channel) DME available by late 1958 or early 1959.

However, the Air Coordinating Committee's recent clear-cut decision, allowing two members soon in which the prospect of civil DME and competitive Tacon elsewhere blew hot and cold, has caught most industry executives off balance, as AVIONICS' Windham notes.

Polk Telecommunications Laboratory, which developed Tacon, is moving rapidly to expand its knowledge with the hope of creating the all-important aircraft market. PTL expects to flight test a prototype Vortac DME within three months. The unit weighs about 30 lb. and is housed in a one-half ATR case; still, provide distance (range) information when operating with either military Tacon ground stations or a civil station which the Civil Aeromaritime Administration will install at present VOR (long-range) stations.

In airline fleet-size operations, the PTL set is expected to sell for around \$5,000, with initial production aimed

able by late 1957, a spokesman told AVIONICS. With By adding another one-fourth ATR size and cost weighing about 17 pounds and costing around \$1,000, both Tacon having a distance estimator can be provided.

Other avionics manufacturers have yet set established firm plans or time tables, Avionics' Windham notes.

• Boeing Radio expects to have a Vortac DME equipment available in 1958-59 to meet airline jet aircraft needs, a spokesman says. Boeing, which previously marketed a civil DME built by Hawker, expects to develop its own Vortac DME.

• Collins Radio says if one buys a Vortac DME available by late 1958-59, the company is willing to accept a three-quarter ATR unit instead of the one-half ATR one offered by the Armed Forces Radio Interoperability Council for civil DME. Collins sees the DME can switch into a one-half ATR rate, but this will delay equipment availability by 3 to 12 months. More important, Collins believes that the reliability of the Vortac DME will suffer if it is switched into a one-half ATR rate since because of heat absorption it will need cooling from the back high density construction.

Collins originally objected to the one-half ATR size specified in the old Army civil DME spec, based on its re-

views expressed in developing a ruggedized military Tacon receiver for the Air Force. Some of Tacon's early reliability problems apparently originated from overloading of the body during construction. The one-half ATR space is made more difficult by an insulating reflector to the administrative offices, Collins says. However, PTL says it has developed new simplified circuits which in combination with use of whom design will enable it to meet the one-half ATR requirement.

• Nasa (National Aerospace Corp.), whose civil DME has been selected by the recent SAC decision, is working for the time to settle an ACR (specification) to go to the Vortac DME. Nasa has been at best uncertain of the selling price (which could affect production work up) for antenna standard (part of the Tacon requirement), comparable to design manufacturing techniques to its popular Draycorder. On this basis Nasa estimated that it could market a Vortac DME (massive coils) for about \$3,100 or a complete customer-facing Tacon set for about \$4,100. A Nasa spokesman says the company's policy is to maintain profits as a byproduct of a line of avionics equipment, but that any new Vortac DME development will probably have to take its place behind the firm's current work load.

• Standard-Carbon Co., which together with Hallinan Electronics Co.

AVIONIC INDUSTRY SALES, EARNINGS UP

Company	Period	Sales	Change From 1955	1956 Profits (After Taxes)	Change From 1955	Earnings Per Common Share*	Change From 1955
Amphenol	6 mos.	\$12,959,556	+23%	\$426,446	+47%	\$1.36	+47%
Consolidated Electronic Components Corp.	6 mos.	12,386,136	+32%	\$68,147	+92%	\$0.50	+94%
Hoffman Electronics	6 mos.	33,495,361	+31%	793,972	+87%	\$1.37	+87%
Ultro Electronics	12 mos.	19,080,000**	+70%	960,080	+108%	\$0.90	+108%
Radio Corp. of America	6 mos.	336,081,080	+4%	30,007,080	-10%	\$1.23	-10%
Servo Corp.	6 mos.	1,462,150	-29%	110,000	-32%	\$0.21	-44%
Remington Rand	6 mos.	7,264,473	+12%	387,447	+35%	\$0.48	+33%
Texas Instruments	6 mos.	19,289,517	+49%	1,039,647	+44%	\$0.15	+66%

* After provision for preferred stock, if any.

** Fiscal year ending 7-31-56.

** Not comparable because of new units when stock was listed on American Exchange, Oct. 1955.

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2. The delay line is stepped every 1.45 microseconds to permit future expansion of the coding system. For example, automatic air-to-ground eight digit identification.
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Progress

The secret Air Commanding Com mando Virtus composite reading several times its filter memory between each VOR/DME and the station. These records in the memory were originally supplied by the Defense Department more than three years ago to get around the frequency conflict between civil DME and VOR.

Aviation Week's article (Dec. 7, 1961, p. 40) which first revealed the existence of the controversy reported: "The way they are believed to have prepared that GAO change to convert its present DME stations to the new military (Trans) system. If they were done, and new civil or future DME were designed for the military system, these tests would go only during automation when they anticipated the converted VOR/DME stations would no longer be used." This was the original intent, says Capt. John T. Tamm, manager of the civil flight data and bearing information. Civil aircraft would continue to use VOR/DME (one range) to get bearing information."

is a second source producer of military Trans receivers, it is on the fence as to whether it should try to exploit the civilian DME market, a spokesman says. Lacking either marketing or serving experience, Stromberg-Carlson might simply avoid the market if it is unable to build sales volume together, much like the case which Hazlewood worked out with Bendix Radio.

Specifications Needed

Except for ITL, potential Virtus DME manufacturers are waiting for the Air Navigation Development Board to come up with Government System technical characteristics for the new DME. Unit ANDB sponsorship, Aerobee Instruments Laboratory (which had some of the negotiations with the Air Force) confirmed that it had drafted a specification for ANDB, awaiting authority to move it into the draft due to its specificity, which ANDB Director D. K. Martin hopes will be ready within 60 days.

Another detail which must be worked out is the posting of Virtus DME frequencies with VOR and ILS frequencies so that pilot selection of the desired VOR station frequency will automatically tune in its corresponding DME frequency. ANDB has given this problem to the National Bureau of Standards which earlier conducted conferences. These frequency allocation studies in connection with moving the Trans-DME handle. Martin expects the frequency pairing option to be worked out without difficulty the winter 60 days.

Aviation Week Electronic Engineers

ing Committee (ARINC) is going to work to resolve the old civil DME characteristics. In all likelihood this will be great to one size, one type, and one matching wiring, because such infrastructure is already available to airplane manufacturers. Arne hopes that the Virtus DME can use the same in reconfiguring wiring and test ways as the old civil DME in word changes in further designs, according to William Canan, manager of electronic engineering.

Indicator Type

One likely change is in the type of DME output indicator. The original ARINC spec permitted the use of a variety type of display (circular, etc.) in order to accommodate the current North American design. However, Canan believes that the digital counter type indicator is preferable to avoid degrading the accuracy of distance information available from Virtus DME.

Arne hopes to get out its preliminary DME characteristics, dealing with form factor and swing, within 30 days. That will be followed later by a more complete characterization spelling out the detailed equipment performance specifications. However, Canan cautions that ARINC has several other high priority characteristics of concern, including single callout, air traffic control signal-



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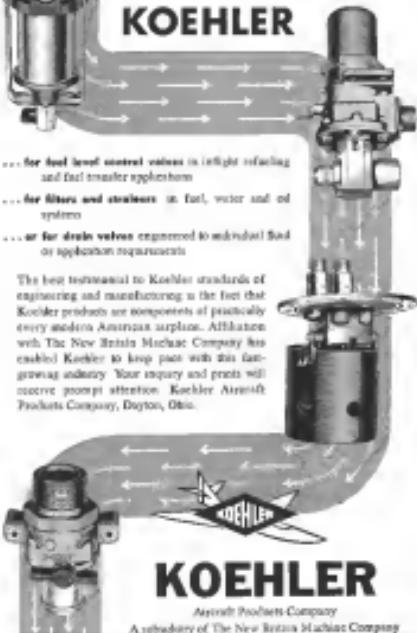
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CAA Fixes

The instant ACC VHF/UHF decision has changed a sizable work load on the CAA, already burdened by its expanded traffic control program. In order to meet the ACC requirement that VHF/UHF DME facilities for high altitude enroute and terminal operations be operational by July 1, 1973, the CAA may be forced to qualify some of its present enroute stations for the placement of initial civil Team ground station equipment, a spokesman says.

To meet the ACC deadline, CAA may buy a limited number of modified stations URN-3 Team ground stations—modified to include dual equipment with automatic switchover in event of failure.

Subsequent procurement would then be made in accordance with usual CAA specifications.

Combined Stations

CAA continues investigating the problem of collocation of VOR and Team ground stations at Philadelphia P-1 using techniques devised by Radio Avionics Development Center. A combined VOR/Team station requires a larger building to house the equipment, a larger VOR controller panel, and additional power.

The Philadelphia investigation will provide the CAA with information on the cost and time involved in the VOR/Team collocation, enabling it to plan its timetable. It may also suggest ways to telescope the conversion to minimum downtime.

After spending disturbing sums of money to upgrade the ACC decision last March, authorized the industry's energies for a much-needed attack on pressing traffic control problems.

Westinghouse Makes Cheaper Rate Gyro

Pittsburgh-Westinghouse Electric Corp. has developed a cheaper more sensitive rate gyro designed around the rotating mass principle. This is the principle used by the陀螺仪 usually to sense flight attitude.

Cold Westinghouse, the Westinghouse division is expected to cut only 50% of what present rate gyro cost. First model is expected to have a sensitivity of from 0.1 deg per sec to 100 deg per sec. Eventually, Westinghouse uses the cut part of two vibrators to produce a frequency signal on another axis, 15° away. Westinghouse type of gyro developed by Sperry-Garrett Division of Sperry Rand Corp., was described in detail in *Aeronautical Week* in its November 27, 1953 issue, p. 57.



Radiation Tolerant 500C Devices Shown



FILTER CENTER
L-6550

► For Experimental Use—Sample quantities of General Electric's new high-temperature expansion resistors and transistors capable of operating at temperatures of 300°C or higher (AW Sept. 10, p. 112) will be available soon to avionics manufacturers for experimental use. Resistors will be available from GE's Specialty Electronic Components Dept., Aviation, N.Y., transistors can from GE's Specialty Transistor Dept., Ft. Wayne, Ind., and 990C mini resistors from company's Capacitor Dept., Hudson Falls, N.Y.

► Motorized Guided-ICG Spark Plug Division of General Motors has revealed that it is producing the metal guidance system used on the new Macchi M.210 (CM-61B) medium fighter plane.

► New Ceramic Tube Types—General Electric soon will announce six new types of ceramic insulating tubes, all insulators, designed specifically for surface applications and capable of operating at temperatures of 300°C. The six types will cover range of ratings up to 100 amperes. Sample quantities should be available this year.

► Low Aircraft-Specific will suffice in SAAB J 35 supersonic fighters with low aircraft flight control systems. Last December R. M. Mack reported:

► Ford ECM-Metal shaft used for electronic counter measures, which dropped off aочки from Pan Amavia, N.Y., caused a number of "dead" flights among hangar crews who ate it and the rest of the fleet is seeking an alternative. The Associated Press reports Elgin is not far from being forced to discontinue ECM units.

► Solar Power To Get Cheaper—Solar panel technology at the cost of making silicon solar cells should cut the cost of generating electricity. In that manner from the present \$600 per watt to approximately \$10 per watt, according to Dr. M. S. Pease, research director, Hallinan Electronics Corp., Semiconductor Division.

► Industrial Propulsion Studies—Reports on two industrial programs—industries that use turbines and turbines manufacturing equipment and the other on silicon power resistors sponsored by Army Signal Corps, are now available from Dept. of Commerce, Office of Technical Services, Washington, D.C. Transistor expert consists of two

volume PB 111821, 200 pages \$5.90, and PB 111820, 42 pages \$1.25. Silicon resistor study report is PB 111824, 42 pages \$1.20.

► Radar ADP—Flight control systems design which develops a good lead/lag position at 1,500 sec. radar to that of a low frequency ADP loop and seat antenna, was described in a Western paper by F. D. Glipp of the University of California's Electronics Research Laboratory and H. Maatta of Hughes Aircraft Co. By presenting a ratio of 100 sec. lead/lag and Maatta said the design could provide a 100 percent flight control during direct reference. This prompted consideration that the antenna could be used for an ADP operating against ground radio stations.

► New UHF Transmitting Structure—New technique for greatly increasing the high frequency capability of transmitting by injecting current directly into the space charge region of a varactor biased P-N junction was suggested by Wolfgang Gartner, Signal Corps Engineering Laboratories, in a paper delivered at Western. Gartner calls the new device a "Depletion Layer Transistor." The Signal Corps Laboratories is experimenting with the new type UHF transmitter, Gartner indicated.

Expansions, Changes In Avionics Industry

► Litton Industries, Beverly Hills, Calif., will purchase Tool Transfer Corp., Los Angeles, and its Indiana subsidiary, Cimco Corp. The new corporation, which will manufacture, assemble, route blind and related products, had sales of \$1.5 million last year, while Litton's sales were \$3.5 million.

Other recently announced expansions, changes and additions in the avionics field include:

► Westinghouse Air Arms Division will add 70,000 sq. ft. of floor space to its present Belmont, Ind., plant. Completion is scheduled for Jan. 1, 1957. An Air Arm employee has passed from 3,000 to 4,000 in the past six months and the figure is expected to double in the next six months according to Dr. S. W. Herbold, division manager.

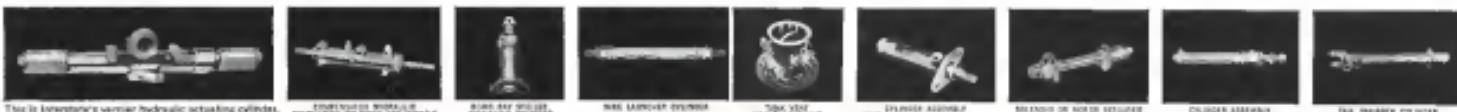
► Lear, Inc., has opened new environmental research and development building adjoining its other facilities at the Santa Monica Municipal Airport.

► General Electric's Missouri Laboratories, Ft. Wayne, Calif., becomes part of GE's Power Tube Dept. in 1950 as



Project Vanguard Minitrack

Microscale radio transmitters, developed by North Research Laboratory for earth satellite, will transmit 100 mc. signal enabling ground stations to track satellite movement. Small crystal controlled transmitters are transistors, weight only 13 gm. Unit puts out 10 milliwatts, is powered by mercury batteries.



This is Interstate's vernier hydraulic actuating cylinder, with its vernier drive sector gear, both mounted for the missile program. By responding to a servomotor mechanism, the cylinder hydraulically actuates a control in effect "tail on tail" in a missile. Built to withstand a pulse load of 200,000 cycles of operation, this actuating cylinder is a representative of Interstate's top quality aeronautical work. The hydraulic actuating cylinder has application whenever you want to convert the linear motion of an hydraulic actuator into rotary motion.

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America's Intercontinental Ballistic Missile program is designed to insure, in present peace — by warning — my would be aggressors that retaliation will be swift and terrible if I did the aggressor should strike. The ICBM will help insure victory!

Research scientists and production engineers at Interstate Engineering Company are to be working their contributions to ICBM through the various hydraulic actuating cylinder parts listed above, and through the development of other component parts.

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AVIATION WEEK is used continually as a technical reference on missile development by the military services and the engineering-management staffs of the missile industry. Already the leader in reporting the major technical missile developments first, when this information is most useful to its readers in their work, AVIATION WEEK will continue to expand and intensify its weekly coverage of the missile industry.

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Navy and Army missile developments on-the-spot from all the major military test and development centers and from the industry responsible for development of missile weapon systems.

Head of AVIATION WEEK's technical staff, Asst. Managing Editor David Anderson, worked in the missile industry on an early ballistic missile weapon system and as a chief project engineer. He is currently attending the International Congress of Astronautics Meeting in Rome as a delegate. Other staff members have had practical experience in the industry in missile propulsion and avionics before joining AVIATION WEEK. The 24 man editorial staff of AVIATION WEEK, combining professional editorial experience with practical technical knowledge of the industry, is unmatched in the aviation publication field and is particularly suited to provide the most complete and technically accurate coverage of the rapidly expanding missile industry.

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Reprints Available

Reprints of Aviation Week's several issues of two studies on the USAF's new integrated procurement panel participation (see Part 2, 30) are now available at 50¢ per copy.

"How to Prepare Papers for the Key Way" is in article by Aviation Editor Elmer F. Kline on the effective communication of technical ideas (AW, July 3, 1964), available at 10¢ per copy with a 10% discount on quantities of 10 or more.

Reprints should be addressed to Aviation Week McGraw Hill Publishing Co., 350 W. 42nd Street, New York, N.Y.

tried to strengthen link between product research and manufacturing.

• **American Broadcasting Paramount Theaters, Inc. and The Western Union Telegraph Co.**, purchased a 25% interest in Wind Jetted Infiltrator Co., Inc., Newton, Mass. The latter makes inlets and diffusers, balance systems, automatic controls and data handling systems used in tunnel designs and high speed models.

• **Automatic Electric Co.**, Chicago, will increase floor space of its new suburban Chicago facility, now under construction, by 200,000 sq. ft., bringing total to 1.5 million sq. ft.

• **Humphrey Inc.**, San Diego, maker of ground support equipment and aircraft maintenance tools, has decided to fold product line directly instead of through present outside distributor. Plant is located at 2805 Camino St.

• **Aerion, Inc.**, Linden, N.J., aerospace component manufacturer, has formed new Canadian manufacturing and sales operation to be called Aerion Canada Ltd. V. J. Miles will head production at Barrie, Ontario manufacturing plant. E. D. Smith will head sales office in Toronto.

New Avionic Bulletins

Electron Optics has issued a digital or analog signal processing system, Type 1000, for use in the AN/ASQ-140 Gunfire Location System. Electron Optics Co., Inc., 1600 West 20th Street, Los Angeles 15, Calif.

Electro-Optical Systems has released a new brochure and placards called "Optronics" to describe its Marconi telescope instruments. 1800-B Concourse Drive, Bronx, N.Y. 10453. No. 2000 Series Precision Color.

Microtronics has issued three specifications and design application circulars for its microstrip and printed circuit boards. Microtronics Corp., 1000 University Street, Seattle, Wash.

Rockwell International, Glendale, Calif., has issued a new specification and test procedure for the AN/ASQ-140 Gunfire Location System. Rockwell International Corp., 1200 South Flower Street, Los Angeles 15, Calif.

Teletronix Laboratories, Inc., Chatsworth, Calif., has issued a specification and test procedure for the AN/ASQ-140 Gunfire Location System.

1000A, 17 sq. ft., Electromechanical Corp., 300 N. State, Maywood, Ill.

• **Thermaltronics Inc.**, 4600 Harrison Avenue, Berkeley, Calif., has issued a specification and test procedure for the AN/ASQ-140 Gunfire Location System. Thermaltronics Corp., 1000 Harrison Ave., San Bruno, Calif., has issued a specification and test procedure for the AN/ASQ-140 Gunfire Location System.

Transistorized Semiconductor is developing a precision electronic scale for use in food service establishments. From Pacific Electronics-Bellis Industries Corp., 11100 Bellis Way, Redondo Beach, Calif.

• **Uniphase and Photo Controls Inc.** have issued a specification and test procedure for the AN/ASQ-140 Gunfire Location System. Uniphase Corp., 1000 Harrison Ave., San Bruno, Calif., has issued a specification and test procedure for the AN/ASQ-140 Gunfire Location System.

Univac has issued a specification and test procedure for the AN/ASQ-140 Gunfire Location System. Univac, 1000 Harrison Ave., San Bruno, Calif., has issued a specification and test procedure for the AN/ASQ-140 Gunfire Location System.

Wetzel Electronics Corp., 1000 Harrison Ave., San Bruno, Calif., has issued a specification and test procedure for the AN/ASQ-140 Gunfire Location System.

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USAF Contracts

Following is a list of unclassified contracts for \$57,000 and over as released by Air Force Contracting Offices.

ACMIS, INC., WATERTOWN, MASS. 01747 (Contract No. AF33(65)-14110) awarded \$100,000 to ACMIS, Inc., 1000 Washington St., Watertown, Mass. 02472, for the development of a communications system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14111) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14112) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14113) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14114) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14115) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14116) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14117) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14118) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14119) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14120) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14121) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14122) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14123) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14124) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14125) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14126) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14127) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14128) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14129) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14130) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14131) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14132) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14133) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14134) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14135) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14136) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14137) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14138) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14139) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14140) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14141) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14142) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14143) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14144) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14145) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14146) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14147) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14148) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14149) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14150) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14151) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14152) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14153) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14154) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14155) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14156) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14157) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14158) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14159) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14160) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14161) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14162) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14163) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14164) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14165) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14166) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14167) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14168) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

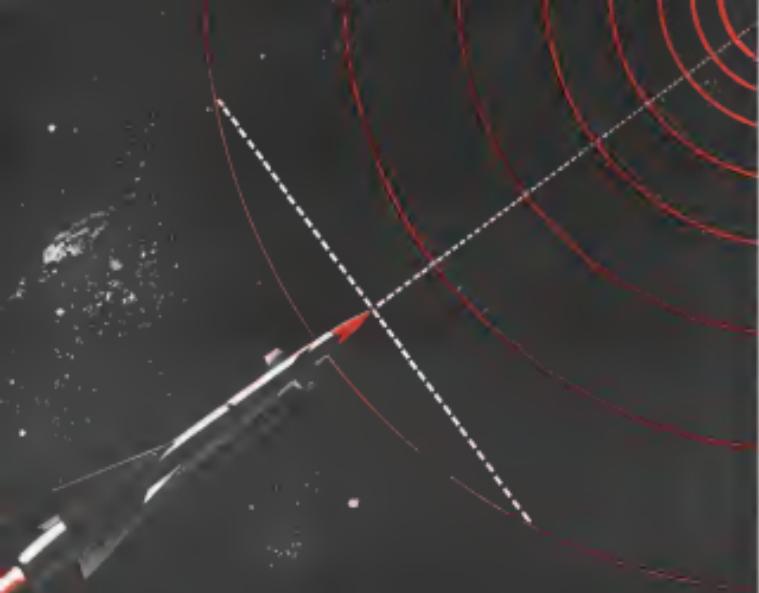
AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14169) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14170) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14171) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

AMERICAN ELECTRIC POWER SERVICE CORP., CINCINNATI, OHIO 45202 (Contract No. AF33(65)-14172) awarded \$100,000 to American Electric Power Service Corp., 1100 Main St., Cincinnati, Ohio, for the development of a power system for the AFM-100.

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S-55 MAINTENANCE WORK at Boufakr. Two squadrons of Helicopter Group II are composed of eight S-55s (type H-19D) each.

Special Report from Algeria, Part II:

Algerian Terrain Challenges Helicopters

By Robert Farrell

Boufakr, Algeria—This river French air force helicopter base is located 30 mi southeast of Algiers. Though at sea level, Boufakr is within 20 mi of rugged mountain regions where bitter fighting against rebel bands occurred. In almost every skirmish, helicopters from Boufakr played a big role.

Set up 15 months ago, Boufakr, to develop a paratroop force, has 180 men, includes 100 pilots and 200 mechanics. Commanded by Col. Deville, the base, though carrying out no active flight operations, is obviously still in the process of being built. Hangars, barracks and maintenance facilities are now under construction. Helicopters are kept up minute-to-minute. Helicopters kick up minute dust storms as they land on the dirt field.

Mixed Helicopter Group II at Boufakr is composed of four squadrons.

The first squadron uses 14 Bell 47Gs built under license in the Agusta Fieri of Milan, Italy equipped with auto-control. The second and third squadrons are composed of eight S-55s (the type H-19D). The fourth squadron is equipped with the new Sikorsky S-58s, or El 500s, one of them recently cracked up.

The initial report from the earth science and geological team, The day was carrying 12 passengers, in a helicopter formation when it went down. The second mission of the S-55s each since June, when the air force at Boufakr first began operating the heavy helicopters. The first mission, a training flight, was also blamed on pilot error.

Big Area

Understandably, all these missions cannot be carried out from the base here at Boufakr. Take as an example the U.S. east of the Mississippi River and you have approximately the size of Algeria. Then there is the 100 mi to the Mediterranean and the Sahara desert and you have the region that must be served by Boufakr's forty-old helicopters. So to better assess just the task, the bulk of the group's dogs are staged—mainly in groups of three—in around 4000 throughout western Algeria up to the Moroccan border. A helicopter task force stays in the field as the average of three dogs sometimes more if a big operation is being run off.

Since its beginning in June 1955, the Boufakr helicopter group has staffed up the following official record:

- Hours flown, 10,782
- Troops transported, 35,681
- Wounded evacuated, 1,571
- Freight carried, 383 metric tons

Recent Record

These figures can, up to the early part of August. Since most of Boufakr's helicopters, notably the big S-58s have been operating out under fire. Now, if one's better to look at a recent month's record. Thus, in July, with seven forth old helicopters available, including ten S-55s the group's official record is as follows:

- Hours flown, 1,644
- Troops transported, 3,242
- Wounded evacuated, 617
- Freight carried, 44 metric tons

Nevertheless, the 1,773 hr flown in July is typical actual operations in the field during the month.

A further study of the July figures puts several interesting comparisons between the work load of the S-55 and the S-58. Flying the month on S-55 earned 1,671 Commandos in 97 hours of flying time. By contrast 3,242 earned 1,680 Commandos in only 80 hours of flying. Boufakr officers say the S-58s have been carrying from 70-12 Commandos at altitudes up to 6,000 ft.

No missions are carried out solo or emergency solo. But since air force officials think certain dog teams represent a waste of resources. They claim the ground forces are now so well as heli-copters that often the craft are used in areas where traditional foot dragging would be just as good and a lot cheaper. "The ground forces just don't appreciate how much it costs to man these machines," complained one air force officer.

Expensive

According to figures worked out at Boufakr, it costs about \$95 an hour to fly a Bell 47G or a Bell 500, but a S-55 and S-58 cost about \$150.

So for no helicopter operating out of Boufakr, like those knocked down by cause fire, though many have been hit repeatedly by south arm weapons. One S-55 at Boufakr, for example has 32 bullet holes.

As a rule pilots wear silk vests, and the air force is planning to wear light armor plates under the pilot's seat and back vest. Seven out of ten dogs enter the aircraft through the bottom hatch. This is one reason why Boufakr's S-55 pilots are glad the main fuel tanks are located under the cabin.

Unlike French army helicopter pilots, the air force pilots at Boufakr fly fixed-wing aircraft before helicopters. Most of them have had 900-1000 hours on either Douglas, Monnett or T-56s (Sikorsky P-34, however, many of the air force helicopter crews



AN AIR FORCE BOEING 707 under escort by Agusta of Milan, Italy, landing at Boufakr.

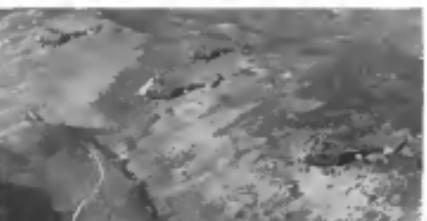


FIGURE 3-194, an a mission from Boufakr, flying over rugged, hilly area of Algeria.



REFUELING COMPLETED at advance base, crew wash off from ground teams.

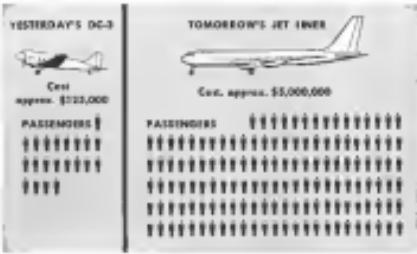


A BOEING HELICOPTER transports a litter case from Boufakr for medical.

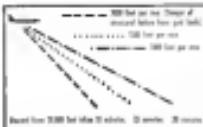
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Approved Aug. 12 Air (68)

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(see page 18 last column). The Air Force took its helicopter pilots from four to five stars, giving them 100 hours more. The S-55 pilots themselves, trained at Bradbury, were the ones sent and these direct from the U.S.

Before flying the S-55s, the pilots put in 100 hrs on the S-55s.

Braden pilots' stats report that the S-55 could fly longer and more solid flying over than the S-55. They claim the load. The heavier the S-55 goes in the air, the more fuel it uses. In fact, the S-55 flies 10% faster than the S-55. Additional points of the S-55 holds a smaller step in landing, passes fewer hours can be reflected in the S-55. As one pilot put it: "With a S-55 you can get around all you want before taking down."

Pilots at Bradbury are averaging 50 flying hours a month. When they go off on a mission, which usually lasts three days, they carry their own oxygen, compression, food and water.

Most of them speak enthusiastically about helicopters, particularly the S-55, and few appear anxious to get back to jets.

Maintenance and Supply

The type of operation being carried out by the Bradbury helicopter group obviously involves special problems of maintenance and supply. For example, a ship has to be utilized so that it can be operating in more remote regions when as 1500 ft. high in the Alps. This also means that the French have had to set up stores of fuel storage throughout Algeria.

Bradbury fuel refills set 500 ft and 1000 ft. supertankers are often pulled in the field while the aircraft is on station. This is not the case with the S-55. For the 1000 ft. supertanker the ship has to be hoisted back to the boat deck. For the 500 ft. supertanker or major refueling, the ship would be forced to the sea. An Air Force mobile rear echelon at Marseilles Blanche near Algiers, though some of them work is being done at Bradbury.

In general, technical personnel here say they have been concentrating their Skymar aircraft according to the crew pre-approved manual. Except for engine trouble, no major maintenance has had to be made due to damage at operating conditions. The Agusta 600s are apparently no trouble at all to maintain.

At present, where a rotation is being carried out by the Skymar agents, special attention is given to the aircraft so as to prevent sand and dust accumulation. But the wind from the French Alps is still very strong at the 450 ft. and 1000 ft. No blade erosion is visible nor do the French complain of any.

A study of the Bradbury maintenance

charts shows that aircraft availability is as high as 70%. This is, however, somewhat less for the S-55. The latter's availability is closer to 60% since the ship is now in refurbishment and doesn't get turned around as fast as the others.

Performance Data

As far as average hours flown on a monthly basis for each type of dog, here's what the Bradbury performance chart shows:

- Bell squadron, 15 dogs, 450 hrs.
- S-55 squadron, 16 dogs, 1500 hrs.
- S-55 squadron, 18 dogs, 400 hrs.

The monthly average for the S-55 group is expected to increase as the ship becomes more familiar to pilots and ground crews. At this rate, the 400 hr. total above for the S-55 squadron is for the group's first full month of operations.

The one reservation then is for leaving the book as open base. In the present, the public concern over the S-55 at Bradbury, type H-1851, which are powered by an 880-hp Wright.

With the book calls for engine change at the 600 hr. mark, here at Bradbury it's necessary to pull the engine at 100 to 150 hr.

I much technical officers are the first out with the engine, but after with the use being made of it. Time and again S-55s have been evaluated with a reading taken on the engine. The book calls for 1000 hrs. of use to be accrued before an engine, have discovered very often there's nothing they can do about it.

Engines Overhauling

A typical example of engine overhauling took place recently not far from Bradbury. Eight French Legionnaires were out of their own pockets by a rebel band and bought four old found themselves parked down along a mountain ridge. An S-55 engine was torn with the rest of its match light.

The pilot landed close to the ridge on a small slope that dropped off into a steep ravine. The rigid boom climbed aboard, but the longitudinal shaft what it should have been for the altitude-rated out a conventional aircraft. Shaking his hands, the pilot "popped off" the pipe into the ravine, where he was able to pull up without firing speed.

Naturally, the French asked, so why didn't they fire the engine? It's a hunting and can't be exposed to a live weapon. But at the S-55 pilot and "Dumb" I have eight to park up, I can't stop shooting at the red tail the rest of the day."

As for the 1525-hp Wright in the



Valve Talk
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BY MARVIN MILES

If you're looking for unequalled high-altitude performance in a fuel pump, better check Whittaker's Ratio-Flo units.

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Not only can it be used with any type of fuel, but it can be adapted to any convenient source of already-purified oil (or any other fuel) in several applications. As a proportional control device, as an engine fuel pump, or as a combined engine fuel and proportioning pump as a fuel transfer control or as an in-flight refueling pump.

The Ratio-Flo pump had its genesis in the flow divider developed several years ago by Whittaker's Del Phillips for the Douglas C-124C to deliver oil in equal amounts to each of two oil motors. This was followed by a flow joint unit and later by a small DC motor driven centrifugal pump to pull oil from a tank in the wing tanks of North America's F-100 Super Sabre.

From these developments, Phillips research engineers—primarily Del Herley—arrived the fuel pump concept, designed for use in fuel tank units of equivalent pump, due to high volumetric displacement efficiency, and ease be serviced to any aircraft for service as well.

To give you a more detailed description, here's the way a Whittaker engineer explains the hydraulically driven unit:

"The unit consists of a positive displacement pump connected directly to a positive Eccentric-Displacement pump. The eccentric action is obtained by the outer action of a sinusoidal belt waveform within a cylindrical cavity.

The pump outer ports are defined by the action of an eccentric wheel which sets the high and low pressure areas. A triangular flow channel is formed by the eccentric wheel and the discharge pressure is defined by a certain ratio of the input pressure.

The eccentric wheel pressure is maintained within very close limits over wide range flow conditions.

As for the eccentric wheel, it can cause the wheel and waveform race to move on the disk up to 150 degrees at the starting point with early revolution. The eccentric wheel ratio is determined by the eccentric wheel ratio. It will provide fluids with static pressures very close to the holding point of viscosity and density.

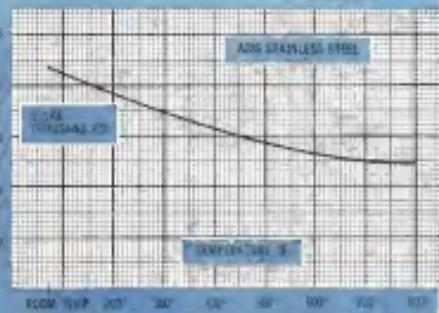
You may be curious, as was I, as to just how fuel proportioning is achieved. Merely by controlling hydraulic pressure, the main pump engine, and the metering pump, the metering pump can be controlled by fluid ratio to proportion various systems in such fashion that the meter will turn at the same speed of the main pump. The metering pump ratio, then, has several types of different capacities can be joined this to obtain a wide range of flow rates."

All this is the result of a long search of the Ratio-Flo development, with the suggestion that it's an efficient, light-weight, high-altitude pump you're looking for—check Whittaker for detailed details.

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8 lbs. the French are thus haven't logged enough engine time to know how the propulsor will stand up. But since the 50 aircraft being prepared at Bourdais, it's said, Mach 10 engine will last 1000 hours at 100% power.

The 250-hp Lycoming on the Agenie has a limited life span in the manufacture and it would take a much heavier aircraft to extend its usefulness, are rarely exceeded.

For the moment, Bourdais represents the only Air Force helicopter base in Algeria. But Air Force officials talk of an expansion program that reportedly is under way, it is supposed to be completed early next year. At that time, the Air Force expects to have in Algeria 60 S 50s, 30 Bell 47s between 20-27 S 15s.

In preparation for this expansion the Air Force reportedly plans to set up two more helicopter bases in Algeria. Bourdais will continue to serve as well as a new base at Djidjelli, in the far western Algeria and a third base as yet unselected will be created in eastern Algeria.

This expansion, of course, implies a base, with the present system under which the Air Force operates in north east Algeria while the Army flies its helicopters in central Algeria. Naturally, the Army is opposed to the move. In fact, the French Army doesn't like the idea of the Air Force transporting ground troops.



New Troop Seat

This new, lightweight, foldaway troop seat has been developed at Kaman Aircraft Corp. to comply with safety specifications MIL-S-5504A. The seat can be stored against the cabin wall when not in use, or it can be folded into a compact package for storage. The seat has been approved by the Air Force, according to the manufacturer.



Night Suit

Designed and designed for use by British Navy "Jumper" probing aircraft during night landings on carrier. Lighted suit (shown) as it looks to pilot approaching an eye at night. Lt. Col. Stuart Seward (below), inventor of the suit, models it.



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A. C. Johnson (left), weight engineer in charge of research and development division, discusses the relative performance merits of several nose landing gear designs with L. T. Mazzoni (center), Structures Division Administrator, and Weight Engineer W. L. Peters.

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Snark Details Viewed by Public At Aircraft Show

Foton mounted underwing auxiliary fuel tanks are fastened on a scale model (top photo) of the Northrop Snark probe-and-dump displayed at the National Airshow, Oklahoma City.

Closer right details taken of the NMM 62 Snark shown at the air pageant, show the rear portion of the two fairing wheel doors. These are a new feature. Right side shows the Allison J31 afterburner here a PAW 17?

Then upfold with "asymmetrical" leading edge is detailed below, left. View of the 74-ft-long Snark (right) shows components, above jet exhaust, housing a probe-and-dump tank, and a Snark recovery. Snarks have underslung and wingtip tanks for fueling





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WHO'S WHERE

(Continued from page 23)

Dr. R. K. Bowes, head of newly formed Space and Astronautics Division, Hughes Aircraft Co., Culver City, Calif.; Dr. Edward Goss, head Month Systems Analysis Department; and Dr. Fred P. Adler, head Intertop for Systems Analysis Department (design work within the same department). Also Edward E. Chidlow, head High Frequency Department, Hughes Control Systems Division.

Fred Kamenskikh, assistant weapons manager, Main Division, ACF Industries Inc., Plains, Pa.; James J. Vass, Director of the Palisades, N.J. Research & Development Center (DCA) at Englewood Cliffs, N.J.; Robert J. Johnson, Director of the Hughes Defense Department, Hughes Control Systems Division.

H. F. Spiker, sales manager, Gok Electronics Co., Culver City, Calif.

J. F. Donald Clegg, manager, Communications Dept., Wright Aeromotive Division.

Thomas S. Tugman, manager of materials manufacturing section, Manufacturing Products Department, General Electric Co., Electric Park, Middletown, Conn.; Joseph W. Lippert, manager, research and development supervisor of the Hughes Flight Propulsion Laboratory, General Electric's Aircraft Gas Turbine Department, Schenectady, N.Y.; Charles V. Trusko, head of wind Advanced Development Department, Intergal Division, Los Angeles, Calif.; Steve Meissner, Calif. Research Department, research and development Planning Dept., Continental Air Lines, Inc., Los Angeles, Calif.

Colin L. Connelley, chief engineer, Avionics Systems Div., Intergal, Inc., Los Angeles.

Radiant H. Carlson, staff engineer for nuclear engineering and Dr. Frank C. Ullett, assistant director research and head of gas turbine research and development, Research & Development Division, Lockheed Aircraft Corp., Santa Monica, Calif.; Frank E. Goss, Vice Mayor, Calif.; the Everett E. Goss, retired flight test division engineer.

Capt. Frank E. Basso, chief pilot, Latin American Division, The American West Airways, Inc., Bogota, Colombia; Capt. Lewis C. Jones, Jr., chief pilot, Pan American World Airways, Inc., Atlanta, Ga.; Capt. Robert S. Wrennberg, a returning to the Latin American Division (material is liaison staff) after a three year assignment at PVAN's Central Model Range Division, Peoria, Ill.; Capt. Luis Tiguez, Peruvian liaison officer and sales manager, Strategic Navigation.

Colonel B. Lester, senior member of test and staff, Judicial Administration Information, Sir Edmund Goss, Calif.

Capt. Sam C. Scott will return to Long Beach, Calif., after a year's absence, having been with the Air Transport Association where he was in management traffic control planning.

Karl D. Swanson, chief research and development engineer, General Motors Division, Radio Electronic Systems Corp., Los Angeles, Calif.

Douglas Hershaw, Director, regional manager, Pacific Scientific Co., Los Angeles, Calif.

Russell E. Wynn, marketing supervisor and George L. Wixson, manager, sales representative, Hughes Inc.

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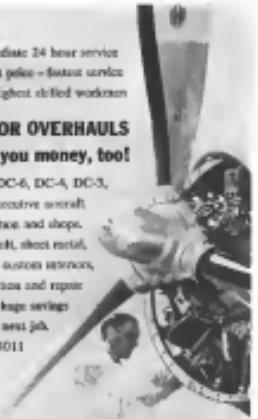
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A set of vibrant green young Michael Faraday book binds his apprentices, not only educated him to a series of lectures by Davy, but opened the door to the Age of Electricity through his discoveries of the principles of the dynamo and the electric motor.

To men like Faraday who would like to associate themselves with eminent scientists, physicists and engineers, Farnsworth's doors are wide open. The portals that created electronic television continue to lead advances in radar; counter-measures; missile guidance, control, and test systems; industrial electronics; special purpose tubes; infrared systems; solid state physics; electronic research, and production . . .

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Your resume—it needn't be 300 pages—will attest prompt, confidential attention.

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This page of Faraday's *Inventories Electrical* at age 21 shows that 300 manuscripts from his notes (which may still be seen in the Royal Institute Library) to back up a brief selling off a job as a laboratory assistant. Get the pic!

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All you have to do is to send your resume and application form to: **GENERAL MOTORS**, Dept. 100, 1000 E. Grand Boulevard, Detroit, Michigan 48202. We'll take it from there.

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Detroit 2, Mich.
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Developing means only one thing—innovation. That's why we're looking for creative, imaginative people to help us develop the most advanced ground handling equipment in the world. You'll be working with the best facilities in the industry, and you'll be part of a team that's been involved in the development of the most advanced ground handling equipment ever developed.

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- Instrumentation Engineering

Or do you have a desire to work in one or more of the following areas?

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■ Propulsion system development

■ Structural analysis and design

■ Aerodynamics and wind tunnel testing

■ Materials and vibration analysis

■ Instrumentation and control systems

■ Propulsion system development

■ Structural analysis and design

■ Aerodynamics and wind tunnel testing

■ Materials and vibration analysis

■ Instrumentation and control systems

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17,000 to 18,000 words, \$950.

18,000 to 19,000 words, \$1,000.

19,000 to 20,000 words, \$1,050.

20,000 to 21,000 words, \$1,100.

21,000 to 22,000 words, \$1,150.

22,000 to 23,000 words, \$1,200.

23,000 to 24,000 words, \$1,250.

24,000 to 25,000 words, \$1,300.

25,000 to 26,000 words, \$1,350.

26,000 to 27,000 words, \$1,400.

27,000 to 28,000 words, \$1,450.

28,000 to 29,000 words, \$1,500.

29,000 to 30,000 words, \$1,550.

30,000 to 31,000 words, \$1,600.

31,000 to 32,000 words, \$1,650.

32,000 to 33,000 words, \$1,700.

33,000 to 34,000 words, \$1,750.

34,000 to 35,000 words, \$1,800.

35,000 to 36,000 words, \$1,850.

36,000 to 37,000 words, \$1,900.

37,000 to 38,000 words, \$1,950.

38,000 to 39,000 words, \$2,000.

39,000 to 40,000 words, \$2,050.

40,000 to 41,000 words, \$2,100.

41,000 to 42,000 words, \$2,150.

42,000 to 43,000 words, \$2,200.

43,000 to 44,000 words, \$2,250.

44,000 to 45,000 words, \$2,300.

45,000 to 46,000 words, \$2,350.

46,000 to 47,000 words, \$2,400.

47,000 to 48,000 words, \$2,450.

48,000 to 49,000 words, \$2,500.

49,000 to 50,000 words, \$2,550.

50,000 to 51,000 words, \$2,600.

51,000 to 52,000 words, \$2,650.

52,000 to 53,000 words, \$2,700.

53,000 to 54,000 words, \$2,750.

54,000 to 55,000 words, \$2,800.

55,000 to 56,000 words, \$2,850.

56,000 to 57,000 words, \$2,900.

57,000 to 58,000 words, \$2,950.

58,000 to 59,000 words, \$3,000.

59,000 to 60,000 words, \$3,050.

60,000 to 61,000 words, \$3,100.

61,000 to 62,000 words, \$3,150.

62,000 to 63,000 words, \$3,200.

63,000 to 64,000 words, \$3,250.

64,000 to 65,000 words, \$3,300.

65,000 to 66,000 words, \$3,350.

66,000 to 67,000 words, \$3,400.

67,000 to 68,000 words, \$3,450.

68,000 to 69,000 words, \$3,500.

69,000 to 70,000 words, \$3,550.

70,000 to 71,000 words, \$3,600.

71,000 to 72,000 words, \$3,650.

72,000 to 73,000 words, \$3,700.

73,000 to 74,000 words, \$3,750.

74,000 to 75,000 words, \$3,800.

75,000 to 76,000 words, \$3,850.

76,000 to 77,000 words, \$3,900.

77,000 to 78,000 words, \$3,950.

78,000 to 79,000 words, \$4,000.

79,000 to 80,000 words, \$4,050.

80,000 to 81,000 words, \$4,100.

81,000 to 82,000 words, \$4,150.

82,000 to 83,000 words, \$4,200.

83,000 to 84,000 words, \$4,250.

84,000 to 85,000 words, \$4,300.

85,000 to 86,000 words, \$4,350.

86,000 to 87,000 words, \$4,400.

87,000 to 88,000 words, \$4,450.

88,000 to 89,000 words, \$4,500.

89,000 to 90,000 words, \$4,550.

90,000 to 91,000 words, \$4,600.

91,000 to 92,000 words, \$4,650.

92,000 to 93,000 words, \$4,700.

93,000 to 94,000 words, \$4,750.

94,000 to 95,000 words, \$4,800.

95,000 to 96,000 words, \$4,850.

96,000 to 97,000 words, \$4,900.

97,000 to 98,000 words, \$4,950.

98,000 to 99,000 words, \$5,000.

99,000 to 100,000 words, \$5,050.

100,000 to 101,000 words, \$5,100.

101,000 to 102,000 words, \$5,150.

102,000 to 103,000 words, \$5,200.

103,000 to 104,000 words, \$5,250.

104,000 to 105,000 words, \$5,300.

105,000 to 106,000 words, \$5,350.

106,000 to 107,000 words, \$5,400.

107,000 to 108,000 words, \$5,450.

108,000 to 109,000 words, \$5,500.

109,000 to 110,000 words, \$5,550.

110,000 to 111,000 words, \$5,600.

111,000 to 112,000 words, \$5,650.

112,000 to 113,000 words, \$5,700.

113,000 to 114,000 words, \$5,750.

114,000 to 115,000 words, \$5,800.

115,000 to 116,000 words, \$5,850.

116,000 to 117,000 words, \$5,900.

117,000 to 118,000 words, \$5,950.

118,000 to 119,000 words, \$6,000.

119,000 to 120,000 words, \$6,050.

120,000 to 121,000 words, \$6,100.

121,000 to 122,000 words, \$6,150.

122,000 to 123,000 words, \$6,200.

123,000 to 124,000 words, \$6,250.

124,000 to 125,000 words, \$6,300.

125,000 to 126,000 words, \$6,350.

126,000 to 127,000 words, \$6,400.

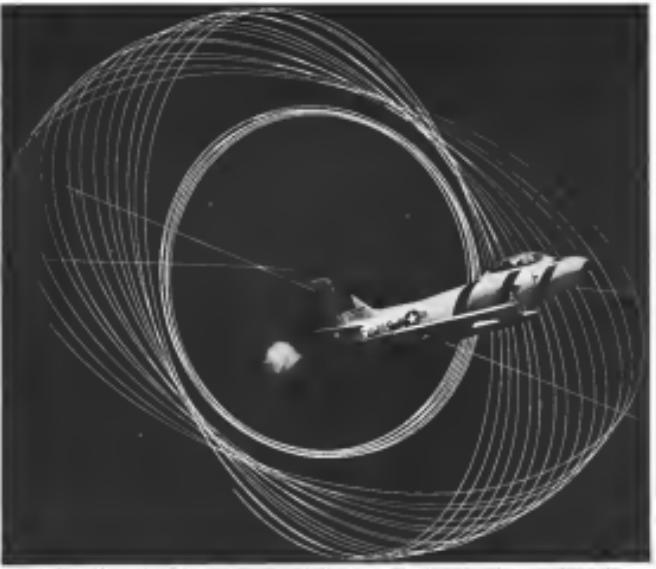
127,000 to 128,000 words, \$6,450.

128,000 to 129,000 words, \$6,500.

129,000 to 130,000 words, \$6,550.

130,000 to 131,000 words, \$6,600.

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Autonetics F-100 Super Sabre

Flight test...the judge and jury of tomorrow's electro-mechanical air crews

It is quite a challenge to develop and produce automated control systems for aircraft that can withstand all the rigors of deep subsonic flight. But to test these systems—at the hypersonic speeds and extreme altitudes where they must finally operate—is equally difficult.

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Yet that's only part of the story. These control systems are already far in advance of accuracy and precision standards worldwide in existing test equipment. So Autonetics Flight Test experts have

demanded special instrumentation and intricate new data gathering systems that, in themselves, constitute a whole new concept of test techniques and procedures.

This is only one reason why Autonetics—in a short time—has become a recognized leader in the production of flight controls, auto-scouters, weapons director, route computers, and other electronic control systems.

For more detailed information—or for application data, the challenge and growing field—please write AUTONETICS Dept. W-6, 12224 Lakewood Boulevard, Downey, California.

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AUTOMATIC CONTROLS MAN HAS NEVER BUILT BEFORE

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LETTERS

IFR—VFR Snafu

The day thought of IFR—Instrument Flight Rules being imposed upon all sorts of the sky has again prompted me to address you in a private group of my colleagues. The general public has been given the benefit of change of our special CAN regulations that make it easier for both IFR operations more compatible to the air law pilot group.

It seems to me that one cannot effectively implement IFR (as defined and be sure makes) check-in or clearance in 2000 ft. It basically is to allow at least some other rules of safety and procedure for said operations as said. This rule seems to legally concern the practice to show around 2000 ft. In this case, the new changes in the opposite side of the chart are by doing the very same thing set up as follows: one that would make it impossible for the pilots to avoid a collision in the first place because of such other

George D. Wiles Jr.
Chief, Public Information Branch
Office of Information Services
Air Force Cambridge Research Center
Bedford, Mass.

Pilots' Case

You recent editorial entitled "We Are All Wrong" was very appropriate. In my opinion your article remarkably approach the situation.

Let me assure you that I am one of strong pro's in favor of IFR. I brought to DOD, the idea of self protection and GPS, all clouds a two way safety belt. I am convinced that if I could just right now put off a cloud of a mounted guns legal ownership allowed and find another aircraft high VFR but with 2000 ft. I have no friends.

I can understand the airline pilot group's desire to have some change, make let it does not seem to me that the solution rests in forcing everyone IFR as one tool many others as an option of change. I believe that the best answer will always be to keep IFR and VFR can be compatible to all.

It could well be that they (bridge group) truly should go single. Right? Is the rule that they must be IFR to transition to a clouded area? I have not noticed anything in the aviation press about this.

Robert E. DeMille
1795 W Street, S.E.
Washington 20, D.C.

Comet Accident

I enclose herewith copies of correspondence in connection with the official report of the Federation de l'Aviation Internationale on the Comet accident at Khrushchev and Sharpen 1955.

In forwarding the material I realize that it is not appropriate to publish it in full, so I hope to illustrate in a clear manner that the investigation of an accident can take for the pilot. This is, of course, not universally the case, but relatively it appears to be so. In the case of the Comet, the investigation of 11,000 pilot's logs of the world and sufficient evidence we feel bound to bear a great deal of responsibility of the pilots but also in the interests of the public whose records are destroyed over time the cause of an accident is extremely important.

We believe in the large losses resulting in the case of the Korean Convair accident but have been denied aerial proof by the authority of the British Ministry of Transport & Civil Aviation and, specifically, of the Royal Aircraft Establishment which is the principal authority on aircraft.

I expect to keep in touch with the British which have studied the circumstance that status of the aircraft concerned would tend to sustain some of the detailed information in regard to misinterpretation of rules out of the

Aeronautic Board's evidence in the famous record of the magazine's editorial review. The magazine's editorial review, "The Comet Crash," by John G. Edwards, appeared in "Flight," February 22, 1956, Vol. 78, No. 4, in the Aeroplane under 200 words and gave no authority when first published. The magazine's editor, however, has written me that his name is not mentioned in the original report.

Unfortunately it is too late to anticipate that several accidents will continue. We only hope we live long enough to make sure that all accidents are rigorously investigated and that their importance is given full play to the public. The crash is not being dealt with present in the United Kingdom and the action we have taken is positive. The only one left open to us is C. U. C. Tattersall.

Technical Services
International Federation of Air Line
Pilots' Association
London, England

Scurvillous Sketch

Please bring here soon that go less than 1000 ft above ground level, between Lockheed and Douglas, of which come to me since 10 days. To determine that the two aircraft drift and danger appearing on p. 72 (I.W. Aug. 15) was the offspring of a Douglas error. Did poster to believe it had greater than 1000 ft above ground level drift for two hours until it was run either Lockheed or pre-Douglas or both. I suspect you immediately see much in failure, run would stop 10 feet east of them on each occasion.

This is the point where a genuine mistake has been made and I apologize. But the surveillance is limited to the pilot's own choice. A wide selection would point out obvious external differences. And as to performance?

I submit strongly to the reference that the two aircraft drift on the basis of the 7-10. I thought the pamphlet of Lockheed's would assist flight ops. in extremely poor rate.

C. James Farns
Lockheed Technical Corp.
Van Nuys, Calif.

(The following is opinion was submitted by Andrew Wiles Jr., who recently completed a course in business and aviation and worked with a number of business and aviation people. He has a graduate's job in the interests of the public whom records are destroyed over time the cause of an accident is extremely important.)

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Diameter behind
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Height 7½ inches
Diameter 8½ inches



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